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THE JOURNAL OF RADIOLOGY

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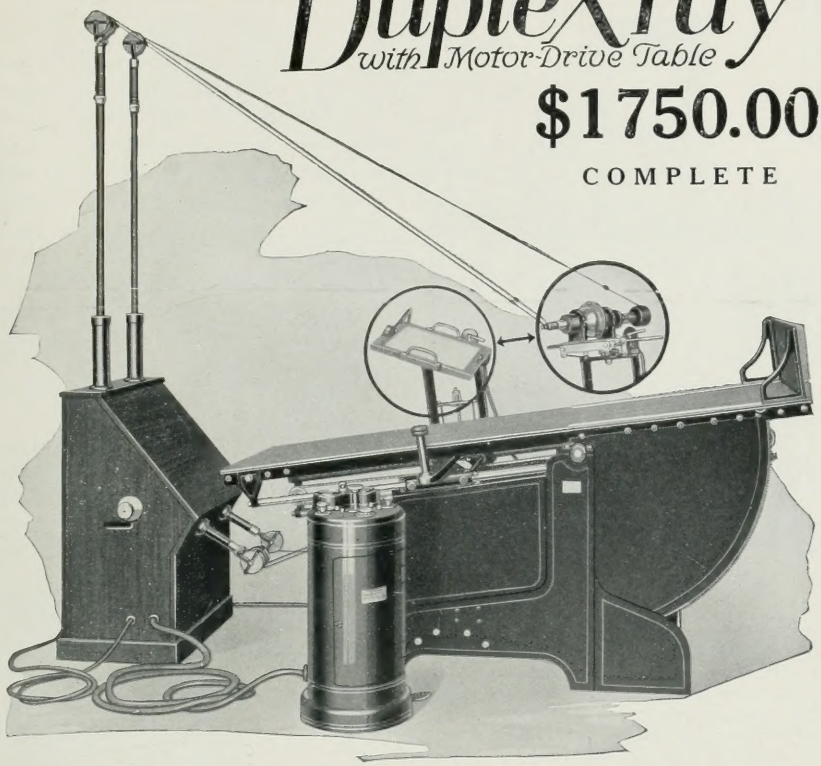

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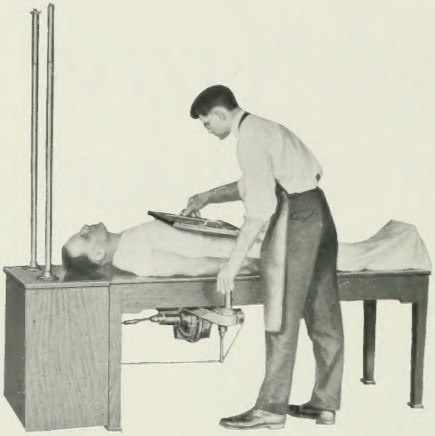

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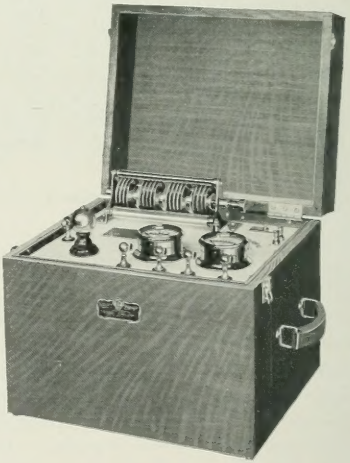

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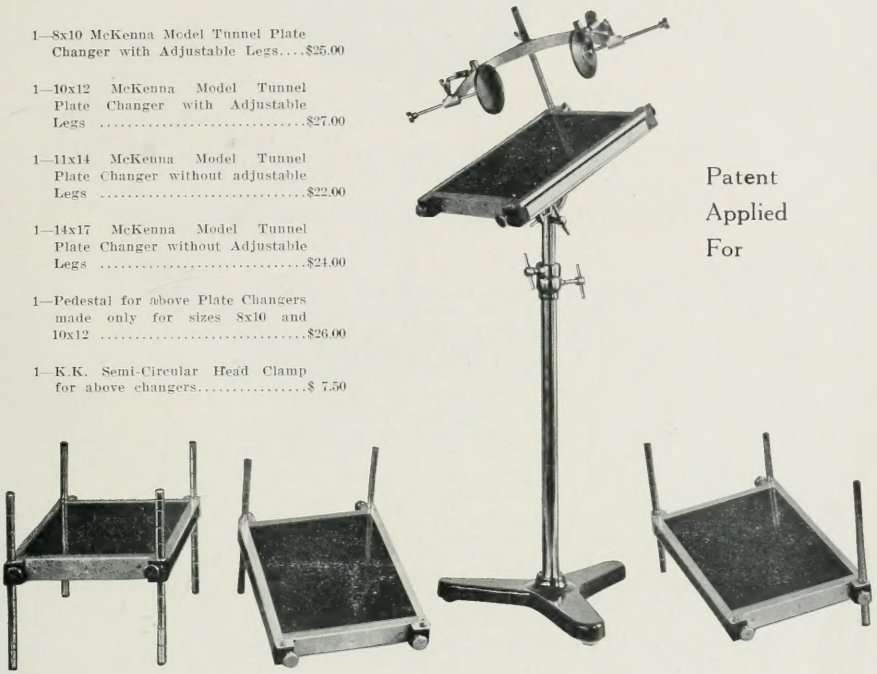

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Radiotherapy in Carcinoma of the Larynx---With Special Reference to Radium Needles Through the Thyrohyoid Membrane*

GEORGE E. PFAHLER, M. D.
Honorary Fellow of the Radiological Society of North America
Philadelphia, Pa.

RADIOTHERAPY in carcinoma of the larynx is not new. Individual cases have been recorded here and there through literature, and some brilliant results have been obtained. Janeway, Barringer and Failla report in their book in 1917, on twenty-seven cases of cancer of the larynx. Of these a clinically complete retrogression was obtained in four, but three patients died later from a recurrence. One was still alive, but was being treated for a small recurrence, which was yielding at the time of making the report. The radium was applied by capsules introduced into the larynx and by radium plaques externally applied. These workers say there can be no question that these results do not represent what should be accomplished in the treatment of cancer of the larynx by radium. As judged by the effects of radium on similar growths situated elsewhere, it is a form of cancer which is usually discovered early enough to yield to radium. The great difficulty concerns the accuracy of application. The majority of these cases have been treated by the insertion of single radium tubes within the larynx, retaining them in place by the little barbed hook. A few of the earlier cases had been treated by the insertion of single tubes on the end of long wires, which were held between the teeth, and a few cases had also been treated entirely by external application. More recently they have been using the three millimeter platinum tube and making direct application of the radium to cancer in the larynx.

In intrinsic cancer of the larynx, several of the three millimeter tubes enclosed end to end in a small sized rubber tube may be passed into the larynx. If the position of the rubber tube is marked by a ligature the whole series can be withdrawn until this tube is just above the carcinomatous area, which will now be in contact with one or more radium tubes. They say that such a method is far more exact than the use of single tubes, which are difficult to place at the exact desired level on inserting into the larynx.

Having very nearly lost one case from edema of the larynx they very properly say that the greatest care should be exercised in attempting to treat a patient with carcinoma of the larynx without a preliminary tracheotomy. If the case is early, it is possible to do so without danger, though even in such a patient the dose should be very carefully adjusted. If, however, the lesion surrounds a large part of the laryngeal cavity, there will be an additional constriction of the laryngeal cavity produced by the swelling and edema following the treatment. A preliminary tracheotomy need not be done in the early cases. They state that this method of application is not applicable with advantage to cancer beginning in the pyriform sinus or cancer of the epiglottis. In cancer of these locations it is wiser to insert individual tubes, making use of the barbed hooks to retain them in place. By this means, in two cases of cancer of the epiglottis, they have obtained a total clinical retrogression.

Barajas says that spreading epithelial tumors undergo a process of amelioration even to an apparent cure. The radium should be placed in situ, using the gamma rays, and avoiding the stimulant action of the secondary rays. He says that not less than 45 to 60 milligrams nor more than 75 to 80 milligrams should be used. A maximum duration of two hours should be used at each session. These applications should be as frequent as the reaction of the organism after treatment will permit.

Cottenot reports a case of cure by x-rays of a spindle cell epithelioma of the larynx in a man of 58, who had a tumor of the larynx, which was later shown by biopsy to have been a spindle cell epithelioma. The tumor was so advanced that laryngectomy was advised, but x-ray treatment was decided upon. To preclude edema, a preliminary tracheotomy was done. From January the 11th to the 17th six x-ray treatments were given on succeeding days. Penetrating rays were used, filtered through 8 mm. of aluminum. The total dosage for the six days was 44 H. There was no skin reaction, nor was there edema of the larynx. A second series of irradiations was given from February 9th to the 15th, 44 H. being given in that time. There was quite an edema this time. On February 22nd there was no trace of tumor or infiltration. The patient was seen every week and on March 15th extubation seemed justified, but, as such a rapid and complete recovery was totally unexpected, a final series of treatments of 15 H., from March 18th to the 20th was given. On April 5th, the tube was removed and the larynx was apparently perfectly normal. The patient had gained five kilograms in weight during the course of treatment.

Alexander reports the disappearance of a squamous cell carcinoma of the larynx, under the influence of intrapharyngeal introduction of 50 mg. of radium sulphate, filtered through 0.2 mm. silver, plus 0.5 mm. brass. Applications were made at intervals of five weeks, ten times in all, for twenty to forty-five minutes at each application, after local anesthesia had been applied. The roentgen rays were applied externally.

Hickey has treated successfully a recurrent benign papilloma of the

*—Read at the Midyear Meeting of the Radiological Society of North America, St. Louis, Mo., May 19, 1922.

larynx, by introducing a catheter through the tracheotomy wound from below and attaching radium by means of a string, which would hold the radium firmly in any position by control from the string above and from one through the tracheotomy tube. He then applied the same treatment in a carcinoma of the larynx. The result of the treatment of the carcinoma of the larynx was not reported. This method of treatment, as suggested by Hickey, is another method of making an application in an otherwise difficult position.

Radium will accomplish best results when it can be applied directly in the tumor tissue. With the exception of the method used by Hickey it is difficult to introduce radium into the larynx and keep it in position for any length of time, especially in an advanced case.

In association with Dr. George B. Wood we have tried to introduce radium into the larynx by means of an intubation tube, but not with great success.

Direct application of radium into carcinoma of the larynx may be made by four different methods: (1) One may insert into the diseased tissue by direct laryngoscopy emanation "seeds" and allow them to remain in place until they are imbedded by fibrous tissue, coughed up, or inhaled. If the carcinoma is ulcerated and friable such seeds may drop or be inhaled into the lung and produce local necrosis or abscess of the lung. They could probably only be introduced into the upper surface of the tumor. (2) Needles containing radium element can be introduced in a similar manner, and, attached to a strong thread, can be prevented from dropping into the lung, but when the diseased tissue is friable it is extremely difficult to make these needles retain their place and not return with the needle holder. (3) One can do a laryngotomy and apply the radium by emanation "seeds" or radium element needles inserted into the diseased tissue under direct vision. (4) One may insert the radium element needles through the thyrohyoid membrane into the diseased tissue, on either side or on both sides.

Insertion of Radium Element Needles Through the Thyrohyoid

Believing that the insertion of radium needles through the thyrohyoid membrane was possible, I first discussed it with Dr. Chevalier Jackson, who also believed it to be practical. I then did this on the cadaver in association with Dr. Robert Hunter. We found that the needles could be placed as desired; the chief requirement being a knowledge of the anatomy and of the location of the cancer.

The patient should have a tracheotomy done before attempting the introduction of the radium needles, because the edema and congestion resulting from the application of the radium might otherwise lead to strangulation, or, at least, to a hasty and inconvenient tracheotomy. If there is not much stenosis, the tracheotomy may be delayed until the preliminary roentgen ray treatment has been given.

External radiation should be given, I believe, by means of the roentgen rays to partially devitalize the primary cancer cells and any metastatic lymph nodes which may be present. This will make the puncture of the neoplasm less dangerous. The preliminary radiation will require one or two weeks, and it may be an advantage to continue the external applications until the tumor tissue has decreased to a standstill. This latter procedure was followed in cases No. 3 and No. 4. In about a week after the tracheotomy has been performed the patient will likely be ready for the introduction of the radium needles. The radium needles should be thoroughly sterilized and attached to sterile thread, or better to sterile copper ligature wire. The needles can be sterilized by being suspended in boiling water. The patient is given a general anesthetic. The skin is cleansed thoroughly by means of alcohol. I believe that iodine is contra-indicated, because of the likelihood of producing a dermatitis, when associated with radiation. If the disease involves only one side of the larynx, I believe the needles can be confined in this treatment to the affected side. If both sides of the larynx are involved, the needles can be inserted on both sides. On the side, on which one proposes to insert the radium needles, the larynx is crowded as far as possible toward the affected side. Granting that the disease extends downward along the affected side, one then introduces the needles as nearly vertically as possible and as nearly confined to the central portion of the disease as is possible. Ten milligram needles can be inserted approximately one centimeter apart and left in place four to six hours. This will cause considerable reaction and probably edema, but if the patient already has a tracheotomy tube in place, there is comparitively little discomfort. If the disease has not completely disappeared at the end of six weeks the treatment may be repeated so far as is necessary. Within two or three weeks after the introduction of these radium needles, if there are any metastatic lymph nodes present, the radium needles may be introduced into the lymph nodes and x-ray treatment can be applied over the general area of the neck involved.

Case Reports

Case No. 1. Mr. P. McL., age 56, was referred to me on May 10, 1920, by Dr. P. F. Moylan for treatment of an ulcerated carcinoma of the larynx with metastasis, noticed October, 1918, or two years and seven months before being referred to me for treatment. He had been treated for five months by Dr. Moylan by local applications, and during six months he had had an enlarged lymph node, which the patient himself noticed, to the right of the neck, on a level with the larynx. Smears made from the throat and examined by Dr. Kolmer for tubercle bacilli were negative. A Wassermann test was also negative. His condition was getting rapidly worse and at the time he was referred for treatment, he was not able to eat anything, excepting soft food and soup. Phonation was painful. He suffered from dysphagia. He had a hoarse persistent cough. He had lost 30 pounds. His appetite was poor. The entire upper portion of the larynx was filled by an ulcerating carcinoma, which had destroyed about half of the epiglottis. The lymph nodes on the right side of the neck measured 4 by 3 by 3 cm. The patient was emaciated and cachectic. X-ray examination showed enlarged upper mediastinal glands, the nature of which could not be determined.

A preliminary course of x-ray treatment was given through 21 portals of entry, covering the entire neck from every angle, as well as the upper portion of the chest, introducing the radiation from all directions toward the upper mediastinum. All of this x-ray treatment was given during a period of five days. The patient then had a tracheotomy performed by Dr. Thomas J. Byrne.

One week after the tracheotomy was done, and two weeks after the beginning of x-ray treatment, the patient was given nitrous oxide gas through the tracheotomy tube. Before any radium needles were introduced, the patient coughed much pus from the tracheotomy tube, which indicated that the purulent material from the upper portion of the larynx had extended downward into the lungs. Under gas anesthesia, eight radium platinum needles, each containing 12½ mg. of radium element, were introduced obliquely downward through the thyrohyoid membrane on the right side and left in place for four hours. Then two were introduced anteriorly upward, one on the left side upward, and five others obliquely downward into the larynx on the left side, and allowed to remain in place four hours. Then four needles were introduced into the metastatic lymph glands on the right side of the larynx and left in place for

ten hours. At the end of this time the patient was in fairly good condition.

On June 21, 1921, or approximately four weeks after the introduction of the radium needles, Dr. Byrne made the following report: "Cancerous growth anteriorly and laterally has almost entirely disappeared. No area of erosion whatever. Posteriorly we have some vertical points sticking directly upward, the sole remains of the cancer invasion. The nodule on the right side of the neck has been reduced to about half." This report was made to Dr. Moylan. Dr. Byrne reported also that "at a previous examination, the whole latter portions of the larynx were involved by an intrinsic cancer. To this was added a very great destruction of the epiglottis, more marked centrally and along the free border. This morning I had my curiosity satisfied by a second examination of the larynx. At the preliminary examination, a view of the cords was impossible. Today it was comparatively easy to see them during tranquil breathing and phonation, which revealed that the left cord was in its rightly fixed position."

The patient had no further treatment after May 24, 1920, at which time the radium needles had been introduced. On July 14, 1920, Dr. Byrne reported: "An examination of his larynx reveals further progress in the destruction of his malignant condition. The remains of the growth described in a previous report show the elevation with a smaller base, that, of course, makes them relatively sharper in appearance. The sharp processes, over the left arytenoid are of a bluish tint, and it would seem that the ultimate effect of your recent radium treatment has not reduced this particular focus of the disease. There is less disease present in the larynx than was present at a previous examination, and there is no evidence of ulceration." During August the patient regained his general good health and seemed in every way to be well, but on August 15, 1920, the patient died suddenly from heat prostration, according to the opinion of Dr. P. F. Moylan.

Remarks: This was the first patient in whom I tried to introduce the radium needles directly into the diseased tissue through the thyrohyoid membrane. The carcinoma itself was so badly ulcerated that it would have been utterly impossible to introduce and keep in place the radium needles by direct laryngoscopy. The tissues were too friable, the ulceration was too great, and the infection probably would have been carried into the lung tissue to a greater extent than was already there, as indicated by the purulent expectoration. Part of the epiglottis had been destroyed. A more severe test of the method could probably not have been chosen, because we began with an emaciated, cachectic patient, with infected lungs and local ulceration, and with metastasis. In spite of these difficulties, he apparently recovered. His sudden death by heat prostration must be regarded almost as an accident.

Case No. 2: Mr. H. S., age 66, referred on August 10, 1920, by Dr. W. D. Allebach and Dr. Spencer Kauffman. Eight months previously he had noticed difficulty in swallowing and slight deafness. During the preceding two weeks both symptoms became much exaggerated. He had lost 33 pounds in weight within six months. He had a large mass about five centimeters in diameter, filling the pharynx and apparently projecting from the larynx. Dr. Kauffman had made the diagnosis of epithelioma of the epiglottis.

Preliminary x-ray treatment was given externally and surface applications of radium were made to the tumor in the larynx. On August 17, 1920, or one week after beginning treatment, 100 milligrams of radium element, in eight needles, were introduced into the diseased area through both sides of the neck, and left in place for seven hours. This seemed to produce a marked congestion and strangulation developed. An emergency tracheotomy was done by Dr. George Coates. Following this application of radium the tumor rapidly decreased in size, and at the end of two months all evidence of the tumor had disappeared. The tracheotomy tube was then removed. Another course of x-ray treatment, however, was given on either side of the neck.

The following radium treatment was given in all: August 17, 1920, 100 mg. of radium in needles inserted into the tissues of the neck at the top of the larynx, on August 31, 1920, 100 mg. inserted into the base of the tongue. September 10, 1920, 50 mg. in 1 mm. of gold and 1 mm. of rubber was applied for two hours at the base of the tongue and repeated again on September 17th and 20th. On September 30, 1920, 120 mg. of radium in the form of needles was inserted about the base of the tongue, and in the left submaxillary region, and the right submaxillary region. On May 24, 1921, there was some thickening of the tissues, over an area about one centimeter in diameter, beneath the left angle of the jaw. We were uncertain as to whether it was part of the original disease or fibrous tissue, secondary to radiation. We, therefore, inserted 40 mg. of radium in four needles directly into this thickened area. There has been nothing to suggest disease since that time. The patient is, therefore, alive and well; almost two years after this extensive disease, from which he had good reason to die.

Case No. 3: Mr. Geo. E., age 48, was referred for treatment on June 20, 1921, by Dr. M. S. Ersner. About nine years before this date he began to have hoarseness. In 1919 he developed influenza and then began to have pains in the head, ringing in the ears, and pains in the chest, with loss of weight, and for a year past had not been able to talk above a whisper. He had had an attack of a smothering sensation and two weeks before he was referred for radiation treatment, on account of danger of asphyxiation, a tracheotomy had been performed by Dr. Ersner.

Dr. Ersner sent with the patient the following description: "Pedunculated mass as large as a walnut is attached to the right vocal cord. The right vocal with thickening of the ventricular band, associated with a great deal of destruction. There is only slight destruction on the left side of the larynx."
tion on the left side of the larynx."

Using a 9 inch spark gap and 5 ma. current, with 6 mm. of aluminum filter and 40 cm. distance, we gave a 25 minute exposure daily for four days, alternating from right to left side, so that within a week he received two of these doses, one on each side of the neck. The treatment was begun June 21, 1921, and he was treated June 21, 22, 23 and 24th. A second course of treatment at 30 cm. distance, with twenty minutes exposure was given on July 14, 16, 18 and 19th. A third course of treatment was given August 2, 16, 17 and 22nd.

He showed immediate improvement from beginning of treatment, and on August 2nd was discharged from the hospital. His voice had increased from a whisper to normal tone. The growth at this time had diminished 60 per cent, according to the estimate of Dr. Ersner. He had gained ten pounds in weight. He was active, alert and looked like a new man. His voice was strong and his color healthy. Dr. Ersner regarded the result as miraculous. The tracheotomy tube had been removed and the wound completely healed.

On September 20, 1921, Dr. Ersner reported as follows: "Patient has infiltration on the right side of the larynx the size of a peanut, involving the ventricular band and cord. He has sufficient breathing space and most likely can stand radium." Dr. Ersner suggested, however, that he should be kept in the house while he was being treated with radium, so that we could insert the tube if we deemed it necessary. On October 3, 1921, before the Pennsylvania State Medical Society, five 10 mg. radium

needles were introduced into the tumor through the right thyrohyoid membrane. They remained in place eight hours.

On October 20, 1921, Dr. Ersner reported that the tumor mass had decreased 100 per cent since his previous examination, which was before the radium treatment. Both his cords were now distinctly visible. On October 18, 1921, he was exhibited before the American College of Surgeons, at which time there was no evidence of disease. On January 16, 1922, he had slight hoarseness, but felt well and looked well. This patient contiues well and is working daily.

Remarks: This patient was suffering from advanced carcinoma, required a tracheotomy to prevent him from strangulation, and under x-ray treatment the tumor nearly disappeared, but finally reached a standstill, and further progress was not made until radium needles were imbedded into the tumor mass, through the thyrohyoid membrane. This, seemingly, has removed the remainder of the disease. He is still kept under observation.

Case No. 4: Mr. H. M., age 64, was referred March 28, 1922, by Dr. Lewis Fisher for treatment by radiation, for carcinoma of the larynx. He had been hoarse for several years, growing progressively worse, with more hoarseness and dyspnea, and he had difficulty in swallowing. Ten days previously his condition had become so bad that Dr. Fisher had been called upon to do a tracheotomy. Dr. Fisher reported as follows: "Mr. M. has a large movable mass in the anterior commissure of the larynx, attached by a broad base to the left vocal cord. There is also a smaller mass on the right cord. The mobility of the arytenoids is considerably impaired. I cannot make out any extra laryngeal involvement."

He was given four applications of the x-rays on each side of the larynx between March 21st and April 21, 1922, with a 9 inch gap, 5 ma., at 40 cm. distance, and forty minutes exposure at each seance.

On May 2, 1922, under gas anesthesia, we introduced ten needles, each containing 10 mg. of radium element, through the thyrohyoid membrane, five on each side, directing the needles downward and into the tumor tissue. They were removed in seven hours. Within twenty-four hours he left the hospital, and within forty-eight hours he reported to my office for observation.

It is, of course, too early to form any opinion as to the immediate effects. It does seem to indicate that the procedure is feasible. Later the method may be abandoned, either because the end results are not satisfactory, or because a better method of application may be found.

Case No. 5: Mr. W. B. F., age 69, referred on May 20th, 1914, by Dr. Wm. H. Teller and Dr. Arthur W. Watson, for treatment of a growth in the larynx just beneath the left vocal cord. Dr. Watson regarded this as an adenocarcinoma. The patient had been troubled with his throat for three months and complained of pain, uncomfortable sensation, some difficulty in swallowing, and at times an interference with his voice, so much so as to make it difficult for him to make himself plainly heard. On May 21, 1914, he was given 13 erythema doses through 4 mm. of filter, and directed through 13 different portals of entry, crossfiring as much as possible upon the larynx. On May 22nd he was given 12 full doses through 12 additional portals of entry. On June 10, 1914, Dr. Watson reported that this heavy treatment had set up considerable reaction, with edema of the arytenoids. The edema was greatest on the right side. On June 11, 1914, 14 additional doses, similar to the previous ones, were given through the right side of the neck; and on June 13th, 12 doses were given through the left side of the neck. On August 1, 1914, 21 treatments were given through 21 portals of entry, crossfiring as much as possible upon the larynx. This was his last treatment and was followed apparently by complete recovery. On July 14, 1919, or five years later, Dr. Teller reported that the patient was entirely well.

Remarks: This patient was well at least five years after a diagnosis of adenocarcinoma of the larynx was made. Since he has recovered there has been some doubt in our minds as to whether this was carcinoma. Wassermann test was negative. Even if this was not carcinoma, but a benign papilloma, we can certainly feel gratified at the result that has been obtained, for it will be a great satisfaction to realize that a benign papilloma of the larynx can be controlled by radiation. In this connection I may refer to two cases of laryngeal papillomata in children that were reported by Dr. Alfred Gray before the American Rhinological and Laryngological Society, Richmond, Va., February 12 and 13, 1909.

In May, 1919, Dr. Gray made a report on three additional cases, and, by correspondence, he tells me that he has added two more cases of adults successfully treated by the roentgen rays. He says: "I feel fully justified in recommending that the roentgen rays be applied in all cases of simple papillomatous vegetations of the larynx and I believe that benefit or complete cure may be confidently expected."

Case No. 6: Mr. E. S., age 55, was referred to me for treatment of carcinoma of the larynx on July 10, 1919, by Dr. J. Leslie Davis. During eight weeks the voice of this patient had gradually faded away, and at the time of beginning treatment he could only speak slightly above a whisper. His general health had remained good. Wassermann test was negative. Dr. Davis found the left vocal cord fixed, with a tumor protruding between the true and false vocal cords. The right cord was freely moveable and worked normally. Wassermann test was negative and all possible interference with the left recurrent laryngeal was eliminated by x-ray examination. During July 10th, 12th, 14th and 16th, this patient was given 12 erythema doses of x-rays, through 12 different portals of entry, crossfiring, as much as possible, upon the larynx. On August 7th, 8th, 9th and 11th, this treatment was repeated. On August 7, 1919 Dr. Davis reported as follows: "Gratified to find voice clearer and general condition greatly improved. The local condition of the larynx shows a complete change for the better. The tumor is still visible, very slightly protruding, with puffiness of the left ventricle of the larynx, but the left vocal cord shows at least a slight excursory movement on phonation."

The patient was given a third series of 12 doses, crossfiring upon the larynx, on September 11, 12 and 13th. On October 3, 1919, he was examined by Dr. Davis and found to be practically well. No further treatment was given. On February 25, 1922, the patient wrote: "I am feeling very good and have had no other treatment for my larynx since last you treated me. I have gone back to my normal weight, 160 pounds. I was around 130 at the time of treatment."

Case No. 7: Mr. H. G., age 48, was referred for treatment of carcinoma of the larynx on March 14, 1917, by Dr. Menah. He had had throat trouble for one year, first complaining of hoarseness, and this hoarseness grew progressively worse. He did not consult a physician until September, 1916. The throat was treated locally. For three days before x-ray treatment the patient had marked dyspnea, which was so severe that he was unable to lie down at night.

Sputum examination by Dr. Warren Batroff was negative for tubercle bacilli. A Wassermann test made by Dr. Small resulted in a pronounced negative reaction. Dr. Menah reported "Lower portion of larynx is involved on both sides. There is in-

filtration of the mucous and sub-mucous tissues. The vocal cords are swollen and contain vegetation-like growths, dirty gray in color. It is malignant without a doubt."

X-ray examination made on March 23, 1917, showed a mass which filled the larynx and projected below. On March 28, 1917, ten portals of entry were outlined on the neck and four on the chest, and four doses were given directed through the larynx, each consisting of a 9 inch parallel spark gap, 50 ma. minutes, 8 inch distance, 6 mm. of aluminum. Within twenty-four hours dyspnea became so marked that the patient was threatened with suffocation by laryngeal obstruction. It was necessary for Dr. Menah to do an immediate tracheotomy at night, in order to save the patient's life. On April 2, 3 and 25th, two additional doses were given through other portals of entry. Because of a misunderstanding, the patient did not return for further treatment until June 16, 1917, or approximately two months later. At that time he looked perfectly well, and was working every day as a stationary engineer. His voice was still husky, but he could speak and make himself understood. On June 16, 18, 19 and 20th a second series of 13 doses was given, crossfiring upon the larynx. On July 24, 25 and 26th, a third series of 12 doses was given through 12 different portals of entry; and a fourth series was given August 29, 30 and 31st, consisting of 12 doses.

On October 10, 1917, the patient looked well. His voice was returning; the tracheotomy tube was closed with a plug, and the malignant disease seemed to be under control. The patient was working daily. On December 8, 1917, Dr. Menah reported from his laryngeal examination as follows: "The swelling on the vocal cord has diminished very much, so that it is possible to see the true cords. The arytenoids are not much swollen and move nearly normally. The vegetation on the true cord has disappeared."

He was given a fourth series in October, a fifth series in November, 1917, a sixth series in December, 1917. On April 23, the patient returned after having been working in a laundry, and looked well. He had some cough which he called a cold. His voice was hoarse, but he could be distinctly understood.

Under date of April 23, 1918, Dr. Menah reported the patient's condition as follows: "Edema of the false vocal cords, and interior of the larynx, also of the arytenoid. The epiglottis is in very good shape. Two cords are now visible."

On May 25, 1918, the patient reported with the tracheotomy tube removed; the wound closed, and the patient was in good general condition. He still had a dry brassy cough, and he still had some hoarseness. At that time Dr. Menah reported as follows: "The patient is in very good shape. The arytenoids are still somewhat enlarged. The true cords are still somewhat congested, but as far as malignancy goes, I think you can make this the last treatment."

The patient continued in good health for another year and continued his work. He did not report in the meantime for observation. He then returned with an extensive recurrent carcinoma, from which he died. However, from a hopeless and strangulating condition, due to carcinoma of the larynx he was given, at least, two years of life and a reasonable amount of comfort by the exposure to the x-rays alone.

Sixteen additional cases have been treated by the roentgen rays. All have shown some temporary improvement. Two showed temporary recovery, but all ultimately died of the disease. As a result of these observations, I believe that we may draw the following conclusions.

(1) Unless the patient is treated very early and before there are obstructive symptoms, it is desirable to do a tracheotomy before beginning treatment.

(2) The roentgen rays applied externally, alone, justify the hope, even in advanced cases, of temporary recovery, or at least partial relief of symptoms.

(3) The insertion of radium needles through the thyrohyoid membrane into the diseased tissue is practical, and the results so far obtained seem to justify further trial.

(4) These patients should be kept under close observation for several years, for the results of this treatment, as well as that recorded by others show a marked tendency to recurrence. Each case must be judged by itself and the treatment directed to the condition present.

BIBLIOGRAPHY

1. Janeway, Barringer and Failla: *Radium Therapy in Cancer*, New York, 1917.

2. Barajas: Radium Treatment of Laryngeal Neoplasms, Med. Ibera.; Abstract, Surg. Gynec. Obst. 29:479, Dec., 1919.

3. Cottenot: A Case of Cure of Spindle Cell Epithelioma of the Larynx by X-rays, Bull. et Mem. Soc. de Radiology, Med. de France. 9:130, June, 1921.

4. Alexander: Beitrag zur Radium und Roentgenbehandlung des Kehlkophkarzinous, Wien. klin. Wchnschr. 33:12, Jan., 1920.

5. Hickey: Intralaryngeal Application of Radium for Chronic Papillomata, Am. J. Roentgenol. 8:155, April, 1921.

6. Gray: Remarks on the X-ray Technique in Treatment of Laryngeal Papillomata in Children, Ann. Otol. Rhinol. & Laryngol, 19:348, June, 1910; Further Report, Virginia M. Monthly, 46:41, May, 1919.

DISCUSSION ON PAPERS OF DRS. SITTENFIELD, BECK AND PFAHLER

DR. E. H. SKINNER, *Kansas City:* There are so many things that attracted my attention as I listened to these papers that I cannot recall them all, and quite naturally the last paper is more in mind. It struck me at the time Dr. Pfahler was reading that we might take it as more or less of an axiom that in the use of radium in any tubular organ it is very necessary to provide that patient with an exit, from a tubular origin below the lesion, before starting the treatment. As Dr. Pfahler said, we must have a tracheotomy done before starting the treatment so that the patient will live through it.

It is quite as necessary in the intestine to have a colostomy in the beginning, no matter how small the lesion in the rectum or sigmoid may be. Not long ago Dr. Bowing and I saw a case of carcinoma of the rectum and we did not insist upon a colostomy because the lesion was so small. We could insert the radium so easily through the protoscope. That patient came into the office just a few days ago with an almost complete stenosis at the site of the lesion. I do not think this is stationary, but it makes me realize that this preliminary colostomy is necessary, just as is the preliminary tracheotomy. No matter how simple the case may appear, we know how easy it is for any patient to develop an edema of the glottis and one often has to do a rapid fire tracheotomy.

So always perform the preliminary tracheotomy and supply the patient with some means of breathing while getting over the radium treatment.

DR. HENRY SCHMITZ, *Chicago:* The point brought out, that only the clearly localized cases of cancer should be operated upon, is one of the most important things that has been told us today. The carcinoma that is no longer a localized disease belongs to radiotherapy. The question arises: When is cancer of the breast localized? If it is localized within the tissue of the breast substance itself, or if it has invaded the skin, or become adherent to the chest wall, or invades the axillary or supraclavicular lymph nodes, it is not any more localized.

We hear frequently about postoperative and pre-operative radiation, and are told that by pre-operative radiation cases are made operable. I think we should discard this view. Raying will destroy the cancer cell as effectively as any surgeon can remove it. If this is a fact I cannot understand why after a radical radiation sufficient to kill the cancer cell, we should resort to surgery afterward. Also, if the surgeon has chosen his case correctly, surgical eradication will remove all of the cancer tissue. Why then should postoperative radiation be used? Hence, the indication for surgical removal is that the cancer is clearly localized within the breast gland. All other cases should be treated with radiations, as surgery cannot hold out any benefits to such cases. If indications were kept sharply defined the permanent cures of surgery would increase in number and radiation therapy would show better results in all the rest of the cases.

It has been stated that in some regions of the body the carcinoma should be removed afterward. This may seem contradictory to you if we refer to my preceding statement. A carcinoma situated in a place where it is free from external or systemic irritation and arrested in its further development by radiation therapy usually remains dormant and often disappears. If the cancer is subjected to local irritation, then after an apparent cure by the rays a surgical excision with fulguration or the cautery should follow.

Observations made in cancers of the mouth, the rectum and on the abdominal wall, where they are continuously subjected to irritation by food, feces, corsets, and so forth, show that they surely recur if not removed after radiation treatment. This may explain the miserable results observed in cancer of the rectum, the bladder and the oral cavity.

The results we see in uterine cancer after x-ray and radium treatment cannot be duplicated in any other part of the body. Ovarian activity is thereby destroyed and the uterus completely necrosed. For all purposes it has been eradicated by the rays. A mass of scar tissue indicates its former location.

DR. HARRY H. BOWING, *Rochester, Minn.:* Although colostomy is undesirable for the patient, as Dr. Skinner said, the patient I saw with him not long ago should have had a colostomy. There are two groups of cases seen, operable and inoperable. In operable cases not only colostomy, but exploration should be performed. Thus, such cases can be classified without any reflection on either surgery or irradiation therapy. Many cases that are determined operable by digital examination are found to be inoperable upon exploration because of distant metastasis. In those that are decidedly inoperable I do not insist on colostomy. Many patients may live without a colostomy, dying eventually of distant metastasis, not of obstruction. The patient without a colostomy is just as comfortable as the patient with an inoperable growth with a colostomy.

I am sure Dr. Pfahler is right when he insists upon tracheotomy in all cases. It is an early tracheotomy that is of value, and not a late one.

I am sure that all cases that are operable should have the cancer-bearing area removed. If the tissues are predisposed to cancer and the condition is inoperable when first seen, intensive irradiation is indicated and in selected cases, should the patient respond, operative measures should be instituted in order to rid the patient of other recurrences. Even the presence of a fibrous growth or tissue after irradiation, may be a source of irritation; a tumor area that can be removed should be taken care of surgically.

The time interval is interesting to me When should the surgeon remove the tissue after irradiation? I am sure that two weeks is not ample time. An interval of six to eight weeks is safer, especially in certain patients in whom reparative processes are slow.

DR. MAURICE J. SITTENFIELD, *New York City (Closing):* I think we are given too much to consider and think of cancer as one definite and specific disease. I am sure, if you will reflect for a moment, you will realize that cancer differs clinically and biologically in practically every organ, and we will probably come to the realization in the future that there is a different etiology and biology for cancer in every individual organ.

It cannot be denied and it is undoubtedly true that heredity plays some etiological part in cancer. Personally I have been interested in this phase in the laboratory and clinic for fourteen years and we cannot get away from the fact that heredity does exert some influence in the immunity and susceptibility to cancer. But do not let us run away with the idea and take it for granted because we see it demonstrated in the laboratory mouse that heredity per se explains the etiology of cancer. There are so many other factors concerned in cancer that heredity alone most likely plays a very minor part; for instance, when a transplantable mouse tumor is inoculated into a heterogenous group of mice, regardless of any other factor, heredity alone cannot explain the 100 per cent takes. There are so many other factors that necessarily play a part that it is impossible to fasten it to any one.

The biology of cancer is something we know very little about. In the one group it remains clinically local for a number of years, in the other it spreads rapidly and the individual goes to pieces in a comparatively short time. You have all seen tumors that could not be removed in toto because they were in areas inaccessible to the knife and incomplete excision was performed, yet in some cases, these patients have lived for as long as fifteen years and then something occurred and they rapidly went to pieces. We are dealing evidently with more than one factor in the etiology and biology of tumors.

In answer to Dr. Schmitz's question, I would say that the time interval between radiation and operation is something to be guided by individual study. In our observation, we have found that the optimum reaction takes place in twelve to fifteen days. Microscopically, we observe the cell nucleus becomes indistinct and the former cancer cell presents itself as a shadow or ghost of what it was before. This reaction sometimes contiues to the fortieth day.

DR. GEORGE E. PFAHLER, *Philadelphia, (Closing):* I can agree with most things that have been said. I believe in ante-operative treatment, and in my work I try to cover this within two or three weeks. Then I try to have the patient operated, but if for some reason the patient will not, or cannot be operated upon or we decide it is best not to operate at that same stage, I ask to be permitted to put radium needles into the tissue. I think time alone can tell whether preliminary radiation with surgery will give the best results, or preliminary radiation with radium needles. I have had beautiful results from both. Time alone will tell which is really the best method. I believe if you depend upon ante-radiation, that following operation there should also be radiation covering the part that is likely to be involved. We cannot cover the entire body, and we know that the disease may spread anywhere, but we can cover the most likely locations.

The Surgical Aspect of Cancer*

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IN SOME RESPECTS the treatment of diseases today resembles greatly the treatment of the same diseases for many years past. This is particularly true of the treatment of cancer. Surgery is still the domain to which the treatment of cancer is relegated; but efforts are being made to treat this disease scientifically by other means, namely, x-ray and radium.

The surgeon of today feels that he has the responsibility of attacking the ailment first, but he feels at the same time that his methods are not sufficient and he would gladly give up the cancer treatment if some method more effective, more adequate and more lasting in its results could be advanced. Only a hypersanguine and overenthusiastic surgeon could speak with pride of his art regarding cancer. Most of us feel rather on the defensive.

Before we go into the detail of the surgical aspect let us state a few generalities in regard to cancer. The scientific and very extensive experience of Maud Slye, Ph. D., has shown conclusively that among animals there is a considerable hereditary tendency to malignant growth and if we can prove an analogy, it plays an important role in the etiology of cancer in the human; but it certainly must be proven first.

Experience has taught us that cancer always begins at some circumscribed locality, a starting point or primary focus, before it makes its appearance. Certain conditions surrounding this locality remind one that not everything is right or normal there. This condition of not well defined irregularities and abnormalities preceding cancer has led the modern pathologist to speak of a precancerous state of tissues. This precancerous state may exist for some time before the really visible or palpable or otherwise recognizable cancer appears. What these peculiarities in the precancerous state are we are unable to state. In the breast, for instance, even before cancer is detected a condition of hypersensibility sometimes manifests itself leading the patient to finger the breast, to examine it, and to detect to her surprise that there is a lump; at first it is really a subconscious feeling which leads the patient to suspect that there has been something in the breast for some time.

The cancer begins to spread from the primary focus in the shape of a spray or fan. The further it spreads from that focal infection the wider becomes the field of the fan or spray until in some instances the whole body of the individual is filled with cancer. This is in general the way the evil spreads until in its progress it produces a condition which ends the life of the individual.

The reaction of cancer upon a body differs. Sometimes the body responds promptly and vigorously and the battle between the individual and the growing cancer is very lively. Sometimes the body wilts away rapidly like a plant in the hot sun, at other times the effect is slow. We call the change produced in the body cancer cachexia, a condition which the experienced eye of the surgeon often recognizes at the first glance and which can be so characteristic as to make the diagnosis of a cancer most probable at first sight. It is the loss of color, the transparency of the skin, the waxy discoloration of the skin, a changed tint, anemia, loss of weight and so on, a complex of symptoms which is very characteristic.

It is only in the very beginning of cancer, in the early stages, that it can be safely removed from the body with sacrifice of local parts in which malignant growth has started. Surgicaly we say that cancer can be successfully resected; but it also can be burned away, cauterized away chemically, or physically by radium or x-ray. It makes no difference what agency is used so long as the noxious material is thoroughly eradicated. Of course, the art of the surgeon who can dissect the cancer carefully with scalpel and unite the dissected portions so as to restore as much as possible normal contours, must be preferable to the poorly confined activity of an arsenous paste which also destroys the cancer, but which depends for healing upon necrosis and elimination of dead tissue. To the layman such a remedy appears more powerful and that is precisely the reason that at times such crude methods as the burning away or cauterizing away of new growth have celebrated triumphs.

If after the removal of the growth no cancer tissue remains behind which could give rise to a new starting point then the individual is perfectly cured; but in most instances neither the surgeon with his sharp scalpel nor the physician with his burning and cauterizing remedies removes all of the traces of cancerous growth, but some residue is left behind which continues to grow, thus giving rise to what we call metastases or the metastatic process. This really means nothing but the transplantation of the cancer growth into some part of the body where the transplanted portions can grow immediately and spontaneously.

Another very important factor is that cancer grows best at a certain period of life, the period of decadence and decline. It is during this period that the growth develops most quickly and easily. Upon this fact is based a very important theory, namely: Cancer grows only in tissue in which are some metabolic changes corresponding to those in old age. some endocrin bodies must be present or absent in order to facilitate the cancerous growth. The most interesting experiments of Fichera in which the introduction of embryonic tissue retarded new growth, were highly suggestive. This observation, which undoubtedly is very important in the study of the development and origin of cancer will probably lead us sooner or later to the real cause of cancer which is at present hidden and unknown. We know only this much, that under given conditions cells become rampant and overrun the place of their first origin and in their vigorous growth destroy natural barriers of such growth. These cancer cells do not seem to be subject to the same law as an ordinary, healthy tissue cell; they show a different reaction from those of healthy individuals. While the natural impetus of growth of the ordinary cell is limited within certain barriers, for instance, epithelium never grows below a certain line called the matrix line, the cell that is cancerous does not know such barriers and breaks through almost every line. While, for instance, the epithelial cells are only on the outside of the body or inside of the cavities of the body and have certain functions and certain histological changes which they never overstep, the cell of the cancer grows into the domain of the connective tissue and into the bone and the nerve or cartilage, respecting no barrier. Cancer cells also show different staining qualities and usually different reactions to the fine physical tests of light, electricity, radium and x-ray.

Upon one of these reactions is based the most important treatment of the present day; it has been found that cells of organized beings are reacting toward the effect of a ray which is not perceptible to the naked eye, the x-ray and the radium ray. It has been found that cancer cells succumb much more easily to the effects of the ray than do healthy cells, and upon this difference is based a treatment which has as its

*—Read at the Midyear Meeting of the Radiological Society of North America, St. Louis, May 20, 1922.

object the destruction of pathologic cells by the ray.

Inasmuch as the ray can find the cell more easily than can the crude senses, this method is much more useful than the surgeon's knife; it can destroy the cell where it finds it and it finds it when the other senses are blind.

Therefore this treatment enjoys a great deal of favor with the present generation of physicians. It has been found, however, that this ray not only destroys the cell which it finds, but is capable of stimulating the growth at first, and so can at times produce a cancer. Observation has shown that at times cancer grows much more rapidly when exposed to the rays, and in order to prevent such rapid growth the effect of the ray has to be studied very carefully. The amount of radium or of x-ray which can destroy pathological cells and also that which can stimulate them can be ascertained only in a truly scientific way. Reports on this phase have been very carefully sifted down and the value of the rays has to be weighed in every individual case. Herein lies the danger of treatment with x-ray—an unscientific routine treatment may do more harm than good.

Taking it all in all, up to the present day we have not been able to find a more successful method of influencing the growth of cancer cells than surgery or than destruction by action of the rays. Since the removal, however, is only attended with success in the early cases, our slogan must be to operate early and radically.

In the early cases in which total removal or radical removal is impossible, recurrence is very likely; in the rest of the cases, prognosis is doubtful and surgery can only do so much as to make it easier for the rays to destroy the cancer cells.

Rays can produce an effect to a certain depth in the tissues, and a therapy which is used for deep seated cancer must protect the overlying tissues, hence we use filters—but filters absorb a great deal of the power of the rays. It is our opinion that if we wish to affect deep seated tissue more vigorously we should remove the protecting skin and overlying tissues if they can be spared, and for this reason my brother and myself have advocated the removal of large areas of skin overlying deep seated cancers and also have advocated leaving the cancer bed exposed after removal of the growth so as to give the rays free access to the tissues.

As to the relative merits of the different methods used in combating cancer and their indications from the standpoint of the surgeon, we have to report as follows:

The first method is prophylaxis. To know the evil is already one-half of the victory, early knowledge is necessary. Let us, therefore, disseminate among the public the knowledge of cancer and all we really and truly know about it; but let us take good care not to overdo in this direction and thereby produce the opposite effect which we are then likely to obtain, for cancrophobia is a disease no less formidable than cancer. Many can be happy, even with cancer, but cancrophobes are all unhappy.

In the first place only the intelligent can understand, the unintelligent must be lead, and herein lies the great difficulty. Physicians first of all must be instructed, and let us admit that many of them do not know enough about this subject and therefore cannot be leaders. We have to instruct physicians first. Newspapers can do a great service, for they are a medium of disseminating quickly and broadly knowledge of things worth knowing; but they are given a great deal to sensationalism and they bring glowing reports of cancer cures and discoveries which are not based on facts. They are responsible for spreading many false conceptions among the public; they must, therefore, be drawn into the circle of the agencies which work along with the profession in the dissemination of proper knowledge. Genuine popular knowledge of cancer explained in plain language ought to be very useful to the public.

One of the great methods of prophylaxis will be along the line of hereditary influence. Eugenists will be very thankful to Maud Slye, Ph. D., for what she has done, but it takes many, many years to produce eugenic results of appreciable character of this kind and we have to work more quickly if prophylaxis would be of avail.

Secondly, as soon as the cancer is discovered let us use our most vigorous methods to eradicate it immediately, surgically if possible, by an experienced surgeon. Let us enter into a little of the detail on this point. As soon as cancer is discovered let us work quickly. At this point there are many pitfalls; in the first place there are many cases in which cancer is not demonstrable and even the best of pathologists are baffled in the diagnosis. Many cures of so-called cancer are not cancer at all. I could mention many cases of my own in which there is no recurrence of cancer after twenty-five years or longer. Diagnosis clinically and even microscopically seemed to be certain at that time, but it seems doubtful now. If such a difficulty exists as a result of ignorance, how much more must it exist as the result of deceit and fraud. Let us first of all be honest, and if we do not know let us say so and let us brand every deceit and every fraud as such.

On account of the lucre which is so easily obtained from the person who fears this dreadful malady many fraudulent institutions are working under the disguise of scientific methods and many imaginary or otherwise innocent derangements are treated as cancer; such cures are heralded far and wide, but they are not cancer cures at all.

First of all there should be the effort of the genuine physician to establish truthfully a diagnosis if such is possible at all and call only genuine carcinoma cancer. Here would be the place for the activity of a commission of the American College of Surgeons or some purifying institution appointed by the American radiologists. Hand in hand with that goes the question of an experienced surgeon. What do I mean by an experienced surgeon? A man who for some years has been assisting and helping a master surgeon and who through this method of first hand instruction has become competent in diagnosis and treatment, is a surgeon. There is no quick way to competency—there is a way to competency through self instruction, observation of cases in one's own practice, and observation of the results of one's own operations; but such an autodidact has to go through all the mistakes and hardships of self development, and this is a very arduous road; much more quickly does the ambitious young man arrive at the higher state of development if he devotes a few years to learning the art with an experienced man. It is during this time that one acquires what is called surgical tact and intuition if it is at all possible to acquire.

To such men, after they have learned judiciously to use the art of surgery should be relegated the work of treatment by surgery. An operation may be easy and the young beginner may do any operation and do it successfully; but as a rule it will be the experienced surgeon who will have the success in the majority of cases.

There is one more point which we must bring out: It is our hope that in our time it will be possible for concerted research to find out the cause of cancer and build upon that knowledge a reasonable treatment or prevention of the disease and that cancer will not be operated upon, but treated by some specific cure or hygienic measure.

We ought to stimulate scientific research in this branch. It is up to us here in America to make that effort. We are now looked upon by the world as leaders in scientific work. If we do not work out this problem it will be our fault, because we have at our disposal the means and the talents.

Radium and Roentgen Ray Treatment in Metastatic Testicular Tumors*

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METASTATIC testicular tumor is a vague term for the pathologic condition encountered in patients with this disorder. The patients under discussion in this paper came to the Clinic with various chief complaints and large abdominal tumors, with or without enlargements of the superficial lymph nodes. The history records that a testicular tumor was removed and, in a short time, that is, a few months, an abdominal tumor and, in a small number of cases, local recurrence was noted. The primary tumor was removed in many instances after a metastatic lesion had formed in the abdomen. This opinion is based on the history of abdominal pain and other complaints usually present with the metastatic tumor. A history of injury to the testicle is not uncommon, but it is difficult to evaluate, since it is probable that the enlarged structure made injury possible. The primary tumor is characterized by rapid growth and early metastasis to the lumbar and renal lymphatics, the thoracic structures, and the left supraclavicular space. The embryologist can readily explain the predilection of the lumbar and renal areas. The anatomist can demonstrate the communication between the lumbar lymphatics and the receptaculum chili, the thoracic duct, and the supraclavicular space where the duct empties into the general circulation. Roentgen ray findings of a mediastinal growth with metastasis to the supraclavicular space are seldom noted in patients when first seen at the Clinic.

Since 1917, more than thirty patients with testicular tumors have registered at the Clinic and have subsequently been treated with radium and deep roentgen ray therapy. One had received a course of mixed toxin treatment, and, at the same time, intensive irradiation. The majority came with a diagnosis of the primary tumor of sarcoma of the testicle, while a few had been given a diagnosis of carcinoma. Most of the diagnoses were based on microscopic examination. The patients were either in good health or markedly undermined in weight and strength. For purposes of study the patients may be classified into two groups: Group 1, patients having large or small metastatic tumors, with good to fair health; and Group 2, patients having large or small metastatic tumors, with general strength markedly undermined. The size or number of the tumors does not seem to bear a relationship to the loss in weight and strength. The duration of the disease seems to be a factor of more importance than the size of the tumor. The undescended testicle is usually regarded as the chief offender in the production of tumors, although in the thirty patients in the series about one-third are recorded as having an undescended testicle. It may be difficult to make a diagnosis at the time the patient is first seen, particularly since it is a moderately rare condition, and the primary tumor may resemble many of the common testicular enlargements. When the patients were seen at the Clinic, it was not difficult to determine the chief reason for their complaints and to diagnose metastatic testicular tumor. Most of the patients gave a history of having had a testicular tumor removed; in the course of a few months, they developed severe pain in the back, referred down the legs, and some weeks later an abdominal mass was discovered. Narcotics are usually required to relieve the pain.

The differential diagnosis in early cases is not easily made. The primary tumor probably offers the chief difficulty in that cases are reported in which the tumors are mistaken for hydrocele, spermatocele, epididymitis, tuberculosis, and so forth. One patient gave a history of abdominal exploration for tumor which was easily palpable. Examination at the Clinic revealed a definite testicular tumor. The primary tumor had been overlooked. The metastatic tumors cause many symptoms which resemble in a measure the common syndromes of the abdomen. In some instances the history referred to exploration of the stomach, since a duodenal or gastric ulcer was suspected, and in one patient gastro-enterostomy was performed without relief. A diagnosis of chronic gallbladder disease as well as cholelithiasis was made in one case, and cholecystectomy performed; the findings were negative. Many of the complaints resemble chronic or intermittent attacks of appendicitis and it is a common observation that the appendix has been removed without relieving the patient. A Wassermann test on the blood should be made in all cases in order to rule out the diagnosis of syphilis, since either the primary or secondary tumor may be gumma. In one instance the supraclavicular growth was exposed and a specimen removed for diagnosis. Exploration was performed in a few cases on account of tumor in the renal area, which was suspected of being neoplasm of the kidney. There was sufficient evidence to warrant this suspicion, since the laboratory findings were indicative of renal impairment.

Given a patient who has had a primary tumor of the testicle removed, within a few months has complained of symptoms in the upper abdomen, and a few months later has noted an abdominal tumor, a therapeutic test of one intensive radium treatment may make the diagnosis in seven to ten days. If the tumor is testicular in origin, it will diminish in size. Fresh abdominal wounds delay treatment; at the Clinic applications are not given until the wound is entirely healed. Drainage tubes placed at the time of the operation are of very little service. The irradiation of large areas of the body surface in the region of the tumor is of more value than a small amount of irradation delivered to a given area through a drainage tube.

The treatment, both of patients with fair or good health and of those with poor health, is practically the same. To all patients who will live a month or six weeks, intensive treatment should be given. There is no known means of estimating whether or not the intensive treatment will be endured. The patients are greatly demoralized, as they have been told of the seriousness of their disease and that their chances for recovery are extremely small. The statistics in these cases are not valuable, since the condition is comparatively rare and the group of patients small. The early patients were inadequately treated. The records show that a course of from 2,000 to 4,000 mg. hours of radium was outlined and that one or two areas were exposed to roentgen ray therapy. The patients were instructed to receive further treatments at home, but in only a few instances was this carried out. One patient's disease was not advanced at the time of examination, but within a few months marked activity developed and he was instructed to consult Dr. Coley, of New York, who gave him intensive irradiation treatment and a course of mixed

*—Read at the Midyear Meeting of the Radiological Society of North America, St. Louis, May, 1922.

toxin. When last heard from, one year ago, this patient was in good health.

In many of our cases the metastatic tumors have disappeared under treatment. The patients seemingly are in good health and have returned to their various activities. Their chance for a more lasting arrest of the disease should be greater than that of the patients treated in the earlier series.

In the radium and roentgen ray treatments, the region of the growth is mapped out into areas (Fig. 1), measuring between 3 by 4 cm. and 4 by 6 cm., the number of areas depending on the time of treatment. The first areas treated are small, and when the treatments are repeated, it is essential to increase the size of the area in order to cut down the possibility of over-irradiation of the tissues due to scattering. This treatment will, in the majority of cases, produce a mild first degree erythema with desquamation within four to six weeks, and in some patients a brown pigmentation. Fifty or 100 mg. radium is applied to each area at 2.5 cm. distance. The best substance to use to insure a uniform distance is balza wood. The block measures 2.5 by 3 by 4 cm. The radium is contained in Universal tube applicators, walls of 0.5 mm. of silver and extra filtration, 2 mm. of lead, and 2 mm. of rubber. No distinction is made between tubes containing milligrams and those containing millicuries, provided the measurements are the same. If the body surface to be irradiated is large, twenty to thirty areas, the amount of irradiation for each area is from 700 to 1,000 mg. hours. If there are less than eight or ten areas, 1,000 mg. hours are delivered to each unit. The supraclavicular glandular enlargements are packed with radium. The tumor may be divided into two to four areas. The adjacent skin surfaces are protected with lead and rubber. The lead is 0.4 mm. thick and is sufficiently large to furnish ample protection. The rubber sheet measures 1.5 to 2.0 mm. thick and is large enough to extend 1 to 2 cm. beyond the margin of the lead plate. All applicators and protectors are maintained in place with adhesive plaster (Figs. 2 and 3).

The number of radium treatments varies. In some, one treatment causes the metastatic tumors to disappear, while in others two to four treatments are required at intervals of six to eight weeks. Treatments with radium should be supported with intensive roentgen ray therapy. Many good results followed the use of the old technique, the formula of which was: skin target distance 23 cm., milliamperage 5, spark gap 23 to 24 cm., time seven minutes, filtration 4 mm. aluminum and a piece of sole leather. The number of areas varied from four to eight in the region of the abdominal tumor; the size of areas measured from 7.5 to 15 cm. square.

Our present technique takes advantage of the newer ideas of deep therapy. In the treatment of patients with metastatic testicular tumors high voltages are not essential, although they may be desirable. Such patients in a measure demonstrate an element of truth in the idea of the so-called carcinoma and a sarcoma dose. The current is sent through a broad focus standard Coolidge tube. In the first treatments, practically the entire lymphatic system is exposed in an attempt to decrease the enlargement and destroy the possible metastatic nodules. Two transverse lines, one drawn at the level of the seventh cervical vertebra and the other at the level of the gluteal folds, are connected with perpendiculars drawn along the lateral wall and middle of the body. These rectangular spaces are divided into four equal areas. Lines drawn on the anterior chest wall at the level of the clavicles and the ensiform cartilage are connected with perpendiculars along the lateral thoracic walls. This square is divided into four equal areas.

The abdominal area exposed to radium is not treated with the roentgen ray. The adjacent abdominal and lateral walls are mapped out into areas measuring approximately 10 to 15 cm. The supraclavicular spaces, axillary spaces, and inguinal glandular areas are mapped into areas sufficiently large to insure thorough irradiation. The formula used at present is: spark gap 23 to 24 cm., distance of skin target 30 cm., milliamperage 5, filtration 6 mm. of aluminum and a layer of sole leather, and time fourteen minutes. This formula may be altered with copper filtration 0.5 mm., and aluminum 1.0 mm., time thirty-five minutes, and milliamperage 5. The other factors remain constant. The cross-fire principle is used.

Fig. 1—Methods of mapping out areas in the region of the tumor. The superficial layers of skin are desquamating, with a brownish pigmentation and some areas of mild redness. It is grossly evident that the skin will tolerate this amount of treatment.

Fig. 2—Balza wood blocks 2.5 mm. thick, 50 mg. of radium filtration, 0.5 mm. silver, 2 mm. lead, and 2 mm. Para rubber fixed to abdominal wall with adhesive plaster.

Fig. 3—Lateral view of Fig. 2.

The patient should be observed at intervals of two months, and if a tumor is not palpable, treatment should not be resumed, although most patients will require from two to four treatments and then a rest of from three to four months.

In the event of negative physical or roentgen ray findings it is safer to treat the symptoms than to wait until a demonstrable growth develops. Lumbar pains are usually indicative of enlargements of the deep lumbar glands.

There is a question of the advisability of reducing the time of application of each block of radium and the amount of filtration. I have not deemed this advisable, especially since these patients are very ill and it does not seem fair to deprive them of a known chance of recovery. The chance of a brilliant primary result is very great, and yet some patients respond in only a fair way. I was skeptical of results in patients with a diagnosis of carcinoma, and yet recently one such patient returned for observation and no palpable tumor could be found. All patients in Group 1 are given intensive irradiation regardless of the pathologic report. Treatment with Coley's mixed toxins is not advised when the case is first seen. In one patient this treatment was given by Dr. Coley, who reported that intensive irradiation treatments had also been administered. It may be well to consider a course of Coley's mixed toxins should the case prove refractory under radium and roentgen ray therapy.

These patients undergo a general reaction as well as a local reaction typical of all patients treated with radium and roentgen ray therapy; anorexia, nausea, and vomiting are common and usually associated with weakness. If the reaction is not too severe, the treatment is continued. As a rule, four to six blocks are applied at one time, and this is repeated on consecutive days until all the areas have been exposed. If treatment is too severe, however, irradiations are omitted a few days until the patient returns to a better condition. In order to place the proper interpretation on the reaction, the entire radium treatment should be given and then be followed by the roentgen ray treatment. Patients who suffer from a general reaction are usually given sodium bicarbonate and in some patients marked benefit follows a grain of codein by mouth. The patients are placed on a fasting diet, fluids are forced, and cathartics are given. In other words, the treatment is distinctly that of elimination. The skin is usually treated with a good grade of talcum powder.

Radiologists are accused of being overenthusiastic and overanxious to apply their form of treatment. Legitimate enthusiasm is warranted, but conservatism both in treatment and prognosis is to be cultivated. A most guarded prognosis should be given and no promise of a primary result should be made at the time the patient is first treated.

An X-Ray Demonstration of the Nasolacrimal Passageways---Normal and Obstructed*

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FEW MORE troublesome problems are brought to the oculist and rhinologist than obstruction of the nasolacrimal passageways, with the attendant symptom of tears discharged over the lid margins. Frequent abscess formation is also a constant menace to the eye itself. Many operations, varying from removal of the sac to reopening the obstruction or making a new opening, have been devised for the relief of this condition, but the pendulum seems to be swinging from the removal of the sac to that of forcible dilatation or making a new opening. In order to determine, pre-operatively, if possible, what is the operation of choice in any given case, we have in the past year and a half been using the x-ray to obtain a picture of the lumen of the passageway and hope to point out in this paper some of the practical points to be derived from this procedure.

The nasolacrimal passageway consists of: (1) The canaliculi, which begin in minute orifices termed the punta lacrimalia near the medial border of the eyelids. They are directed medially, and converging they enter close together, or through a common opening, into the lacrimal sac slightly below its middle point. (2) The lacrimal sac is the upper expanded portion of the passageway measuring about 12 mm. in length. This has a rounded upper border narrowing below into the nasolacrimal duct and lies in a groove formed by the lacrimal bone and frontal process of the maxilla. (3) The nasolacrimal duct measures about 18 mm. in length. It is directed downward and slightly backward and opens into the inferior meatus of the nose, terminating in a somewhat narrowed orifice.

Many and varied forms of treatment have been advocated for the relief of this condition, but most of these can be classified under three heads: (1) The passage of metal probes or curets through the constriction, attempting thus to relieve the obstruction. This is very painful and has to be repeated many times and therefore can never be a popular method. (2) Removal of the sac by operation or its obliteration by the use of a caustic, resorted to in despair of any method of keeping the passage open and also because of the danger of abscesses in this region. The objection to this method is that it makes no provision for the drainage of excess tears which must then drain over the lid margin, a constant source of discomfort to the patient. (3) Making a new opening into the nose to establish free drainage for the tears and to prevent pus formation in the sac, hoping by this means to restore normal function. This operation is accomplished by making a short circuit from the sac into the middle fossa of the nose by means of a large window in the lateral wall. West, in 1910, was one of the first to popularize this form of intranasal operation.

It is quite evident that in this form of operation precision is considerably reduced by the lack of pre-operative knowledge concerning the exact point of stricture and the size and shape of the sac above this. An attempt has been made in this work to produce a radiograph of the portion of the sac above the stricture, in relation to the surrounding structures, and also to show the size of the opening in the lateral wall of the nose following the intranasal type of operation.

The technique followed in this work has been, first, to undertake the usual routine of attempting to syringe solutions, by way of the puncta, through the sac and duct into the nose. Following this the passageway is injected with Beck's bismuth and oil paste. This is accomplished by first dropping a few drops of two per cent cocain solution on the lower lid. The sac is then cleared of mucus or pus by pressure over this. The passage is then syringed

*—Read at the Midyear Meeting of the Radiological Society of North America, St. Louis, May 20, 1922.

Fig. 1—Normal case, showing both passageways as seen in the posteroanterior position.
Fig. 2—A normal passageway as shown in the lateral position.

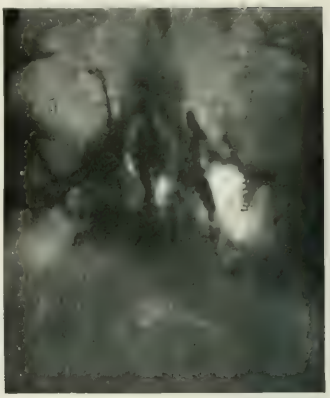


Fig. 3—Normal case, showing a side to side junction of the sac and duct.

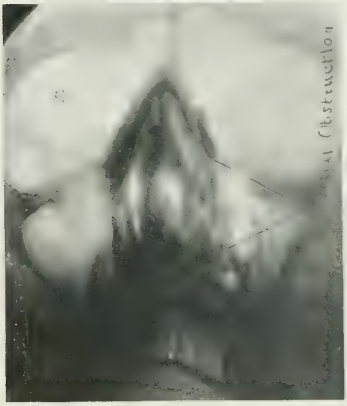
out with normal saline to which a few drops of 1 to 1,000 adrenalin solution have been added. It may be desirable to dilate the puncta slightly, but under no circumstances do we slit the canaliculus. It is also necessary in some cases to obstruct the puncta not used in the injection and this may be done with a common pin. The passages are then injected with the bismuth paste, using for this an ordinary all glass Luer syringe and a No. 19 blunt needle. When necessary to warm the bismuth, dry heat should be used, as steam will precipitate the oil out and difficulty will be experienced in getting an even flow through the fine caliber needle. About 1 c.c. will be used on those cases without obstruction, while one-half that amount will usually suffice in those with obstruction.

For purposes of localization with respect to the surrounding structures it is very valuable to place a small silver rider over the anterior end of the middle turbinate just below its attachment to the lateral nasal wall. Another method of considerable value is that of outlining the position of the anterior end of the middle turbinate by a strip of bismuth paste. This is easily accomplished using a long lacrimal needle for this purpose. A radiograph made in the lateral position will then show how much of the unobstructed passage lies above or below the root of the turbinate and also whether it is in front or back of the turbinate.

Fig. 4—Normal case, showing side to side junction of the sac and duct.

In our experience there is no harmful effect associated with this procedure, either in the normal or obstructed passageway, if it is carried out by some one familiar with the technique of syringing the passageways and if ordinary care is exercised. If properly done the patient usually complains of no discomfort from this injection.

Following the injection radiographs in several positions are made of this region. The positions which we have found to be the most valuable are the



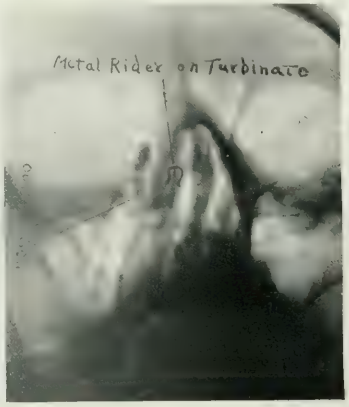


Fig. 5—Same case as Fig. 7. Shows partial obstruction on left. The duct is very narrow and constricted.
Fig. 6—This case shows an obstruction high up in the duct. A metal rider indicates the position of the middle turbinate on this side. Before operation.
Fig. 7—Obstruction at junction of sac and duct.

following: (1) The Waters-Waldron sinus position, in which the chin rests on the plate with the nose slightly elevated. (2) This is a modification of the Waters-Waldron position. The head is rotated toward the side which has been injected with the bismuth paste. This tends to throw the injected sac over the shadow of the ethmoid cells and will cause the sac to stand out with considerable clarity. (3) Here we use the forehead-nose position, which also tends to throw the sac over the ethmoid shadows. (4) This position is with the head in a true lateral position and it is very important to guage the anteroposterior position between the sac and the middle turbinate, which is marked by the metal rider or stripe of bismuth. We have found stereoscopic plates to be of great value in determining the position of the various structures.

During the last twenty months we have studied about 80 cases, including both normal and obstructed cases. In the normal cases a number of variations from the generally accepted normal have been found. In a number of these cases, the passageway has been very much twisted and tortuous in shape, with considerable variation in its lumen; also while normally the sac and duct are joined in an end to end union, several cases have been found presenting a side to side union, and it is easy to see how, in many of these cases, one would be doomed to failure in attempting to pass a probe through this.

In this series are included a number of negroes, and in individuals of this race the nasolacrimal passageway was found to be unusually wide and straight which probably explains the relative rarity of pathology in this region among members of the black race.

In those cases presenting a definite obstruction two extremes have been found: (1) Where a portion of the sac is very much dilated, similar to the dilation seen in the esophagus above an obstruction. (2) Many showed the sac to be very small because of abscess formation followed by scar tissue contraction. All grades between these have been seen. A number of cases giving symptoms of partial obstruction have been examined and in these cases we have found areas of constriction, but not obstruction, which apparently are ample for the ordinary needs, but which fail to function properly when there is a considerable quantity of tears to be carried away. Very valuable pre-operative information is obtained by the surgeon as to the type of sac present. This will have considerable influence as to the type of operation decided upon.

Postoperative Data

The x-ray plate has been of value in several postoperative conditions: (1) In those cases in which a short-circuiting operation into the middle fossa of the nose has been performed, the exact size of the opening can be noted and a fairly accurate prognosis made as to the permanent relief of the patient's symptoms. (2) A number of cases having had operations for removal of the sac, later complain that they are able to express pus from the lacrimal fossa. By means of the x-ray we are definitely able to show if the sac has been removed in toto or in part, and if the latter is the case, how much of the sac remains and what is its condition. This information is of great value to the surgeon in determining if enough of the sac is left in place to make a short-circuiting operation into the nose feasible, or if it would be better judgment to completely remove the remaining portion of the sac.

Relation to Sinus Pathology

Owing to the belief in many circles that disease in the nasolacrimal passageways is usually associated with or caused by chronic pathology in the paranasal sinuses, it has been deemed wise in this series to compare the relative occurrences of the two. We have been struck by the relatively high proportion of cases showing pathology in the sinuses associated with pathology in the lacrimal apparatus.

In a series previously reported by us there have been twenty cases of complete obstruction of the passageways. Among these, sixty per cent showed evidence of chronic pathology in the paranasal sinuses and every one of these showed involvement of one or both maxillary sinuses, which are the sinuses most intimately associated with the lacrimal sac and duct. While this series is very small to draw any conclusions from, we hope that others will report their statistics, when available, to prove or disprove this point, and we have in progress at the present time a more detailed study of this point, which we will report at a later date.

Table I.

Sinus Involvement in Obstructed Cases.

Pathology in sac or duct	20	100%
Pathology in sinuses	12	60%
No pathology in sinuses	8	40%

Table II.

Relative Involvement of the Sinuses

Pathology in antra	12	100%
Pathology in ethmoids	3	25%
Pathology in frontals	0	....

Table III.

Comparative Pathology on Obstructed and Non-Obstructed Sides.

Sinus pathology found	12	100%
Sinus pathology same side as lacrimal pathology	9	75%
Sinus pathology opposite		

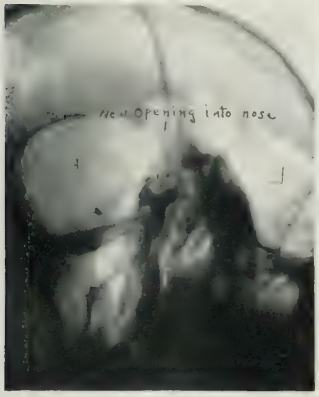


Fig. 8—Same case as Fig. 7. Shows operative opening into nose with bismuth passing through this.

Fig. 9—Before operation. Shows an obstruction at the junction of the sac and duct with some dilation of the sac.

Fig. 10—Same as Fig. 9. Shows operative opening into nose with bismuth paste passing through this into the nose.

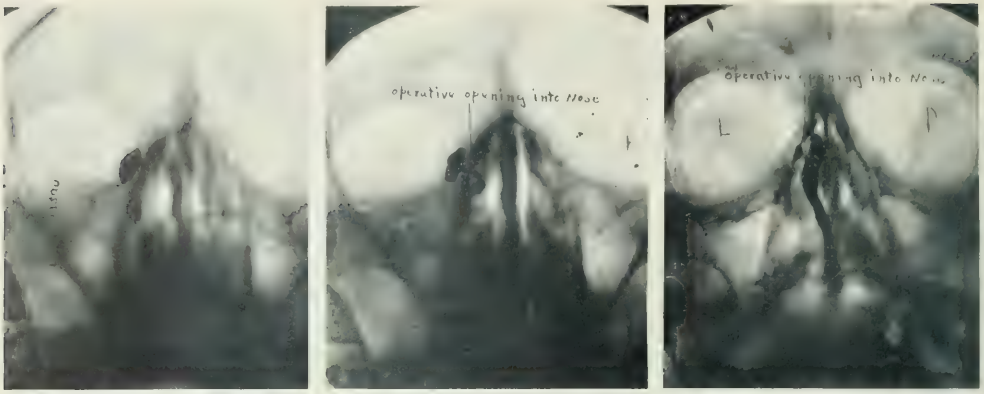


Fig. 11—Before operation. Shows obstruction at junction of sac and duct.
Fig. 12—Same case as Fig. 11. Shows operative opening into nose. The opening in this case was too small and had to be enlarged later.
Fig. 13—Shows an obstructed sac with an operative opening into the nose and a large amount of bismuth paste which has passed into the nose.

side of lacrimal pathology 3 25%

Conclusions

It would seem apparent that the x-ray offers much valuable information which was heretofore unobtainable by the older methods of examination. Some of the cases in which it has been found to be of value are the following: (1) In cases of complete obstruction one may determine exactly the point of obstruction and the condition of the sac above this. (2) Postoperatively one may determine the size and position of the operative opening into the nose and also the rapidity with which the opening closes in cases progressing poorly. (3) The subsequent progress of cases of partial obstruction may be followed to determine the form of therapy to be used. (4) Following operation for removal of the sac it can be definitely determined whether the sac has been completely removed. (5) Cases presenting symptoms of partial obstruction, but showing normal passageway by means of x-ray examination, should be investigated for evidence of reflex stimulation of the lacrimal glands as the cause of epiphora. (6) The condition of the paranasal sinuses, especially the antra and ethmoids, as a possible cause of the obstruction, can be noted. (7) The relative position of the middle turbinate can be determined as an aid in cases where operation is to be performed. (8) Anatomical anomalies which would make probing operations dangerous can be pre-operatively determined.

Peptic Ulcer*

R. T. WILSON, M. D.
Temple, Texas

PEPTIC ULCER is a disease so increasingly common and so disabling, the recent advances toward its accurate identification so significant, the economic element involved in its treatment so important that frequent discussions seem justified as well as much study demanded of those whose responsibility it is to deal with these unfortunate patients.

In attempting to prepare a paper on this subject the writer is not unmindful of the vast scope which the subject contemplates when followed into its various ramifications; for even a reasonably exhaustive discussion of gastric or duodenal ulcer alone would require many pages. Neither are we unmindful of the many excellent articles written on this subject in the past decade by men of prominence and broad experience.

The object of this paper is to contend for the actual demonstration of the deformity in peptic ulcer. This contention will be discussed under two general heads: (1) Personal disappointments with the indirect signs, and (2) Insistence upon finding the deformity of the gastric and duodenal contour.

A prominent Texas surgeon was heard to say in a recent discussion that no clinic is doing extensive gastric surgery without the assistance of a competent roentgen ray department, because there is no other way to definitely localize and identify the lesions or to convince patients of their need of surgical attention.

Mills, [1] a clinician of St. Louis, sets a high standard for us and therefore places a great responsibility upon the conscientious worker who would verify his remark when he says: "There is no precedent, in any specialty, for such a revolutionary factor suddenly developing, as the x-ray has proven to be in gastro-enterology. Successful abdominal diagnosis, prior to its advent, was devious and largely a matter of shrewd guess work. It has been transformed by roentgenology, as practiced by skilled men, into one of the most accurate subjects in clinical medicine. The influence of the x-ray on subjects collateral to gastro-enterology, surgery, topographical anatomy and alimentary physiology is very great—only relatively less important. It has no limitations. The limitations are our own. Its only weakness is in its strength. * * * It is conventional to assume a pose of conservatism on the value of the x-ray in gastro-intestinal work, but I have little doubt that the foregoing is about what, with good reason, we really believe, and it certainly seems the position of thinking clinicians today."

As intimated above, it is obviously impractical to undertake to deal with minutia of the various deformities and

*—Read at the Midyear Meeting of the Radiological Society of North America, St. Louis, May 19, 1922.

manifestations roentgenologically encountered in gastric examinations; but, in the hope that we may emphasize some phases of this important work and elicit a discussion which shall be helpful to all, we herewith present a brief review of the present status of gastro-intestinal roentgenology as it relates to peptic ulcer in our institution, a surgical and general diagnostic clinic.

Upon admission the patient is taken in charge by the clinical department, where a careful history is written and such preliminary examinations made as seem indicated. He is then referred to other departments according to indications. Those patients suffering from any of the following symptoms are referred to the x-ray department for the examination of the gastro-intestinal tract: Vomiting, epigastric pain, hemorrhage from the stomach or bowels, progressive loss of weight, marked anemia, upper abdominal colic, epigastric tumor, visceroptosis, vague abdominal distress without symptoms which are referrable to certain organs, indigestion or the so-called chronic dispepsia (which term covers a multitude of sins), and sometimes examination is made to satisfy the patient, the attending physician, or the clinical staff. Richard Behan [2] in his monograph on *Pain* makes this significant statement, "Almost 90 per cent of all diseases either begin with or have pain as their prominent symptom at some time during their course." Other clinicians say pain and hemorrhage send most patients in search of medical advice. Since a large percentage of patients suffer with some of these various symptoms and since the clinical evidence alone is sufficient in only about 50 per cent of the instances, according to eminent clinicians, any method which offers reliable assistance is eagerly sought and welcomed by all concerned.

For purposes of this study, we have consulted the records of 2,844 patients examined since January 1, 1918 (13 per cent of the clinic admissions) which came under one or more of the foregoing classifications. We shall refer, however, only to those cases which were roentgenologically considered as peptic ulcer. There were 363 of these, or 12.7 per cent of the number examined.

As roentgenologists, we are perhaps all agreed that the details of technique are not of so much importance as that we should develop a technique best suited to our conditions or inclinations and consistently follow it, for it is the frequent repetition and careful comparison of the observations of physiological phenomena, which prepare us for accurate interpretations. It is said that Dr. Osler once asked a medical student how he recognized a certain patient as having "paralysis agitans." The young man began to answer by enumerating the symptoms of the disease in question, when the wise teacher interrupted and said, "No, saw it before."

The patient for gastro-intestinal study reports at 8 a. m. with a fasting stomach, breakfast and all drinks omitted, although his daily routine with reference to meals and medicine is not interrupted even for one day previously. We do not agree with the statement of some that gastric lavage is necessary to guarantee an empty stomach, for we have had patients come from the lavage room when the clinician thought he had emptied the organ and we have found considerable liquid contents in it. But emptiness, while very desirable if practical, is not the most important element, for the administration of a test meal or even the passage of a lavage tube produces irritation and other abnormal conditions which are unnecessary and which in many cases may require tedious and unsatisfactory explanation when doubtful findings are encountered. The important thing is that the conditions be as nearly normal as possible for that patient. Then if residual contents are present it is a significant fact and should be explained by subsequent findings.

The examination is primarily a fluoroscopic one and in the upright position when possible. Roentgenograms are made only for record, for confirmation or for purposes of demonstration. The writer has not yet succeeded in radiologically demonstrating a lesion that has not previously been seen on the fluoroscopic screen. On the other hand, it is ofttimes very difficult to make films of the stomach adequately disclose the identity of a lesion undeniably seen under the fluoroscope. We do not read the history and very seldom question the patient except as to breakfast. If this meal has been omitted we proceed, except under extraordinary circumstances, otherwise the patient is sent away to return next morning without breakfast. The bariumized milk meal, preferably buttermilk, is used almost exclusively, sometimes plain water or a malted mixture is used. Interval observations are made to determine the function of stomach and intestines.

For the sake of brevity we will attempt only a discussion of the positive gastric and bulbar findings, since including the negative findings would lead us far afield and would necessarily be tedious to you who are so familiar with them.

During deglutition the muscle tonus of the stomach is observed and may be classified as good, fair or poor, according to the manner in which the food is held toward the fundus in funnel shape and allowed to settle to the most dependent portion of the organ as the contents separate the walls. This ranges from sagging of the organ to cases in which the organ fills as a cloth bag would fill, allowing the contents to settle immediately to the lowest portion.

Having distended the stomach with the opaque meal (10 to 14 fluid ounces), our observations are directed to the behavior of the peristaltic waves. Usually where pathology exists we have one of the two extremes, hypoperistalsis or a hyperperistalsis, depending upon the character and location of the lesion, the duration of its existence and whether obstruction is present. In cases of obstruction at or near the pylorus we may have alternating periods of these two extremes. Hypoperistalsis is often seen in atonia, and hyperistalsis is seen in acute abdominal inflammatory conditions such as cholecystitis, appendicitis, etc. We have also observed this latter phenomenon in cases of morphin addiction, pellagra, and in patients who had undergone cystoscopic examination within the past 24 hours.

Luminal contour next deserves our attention and upon this we cannot place too much emphasis.

Two years ago, before the Texas Roentgen Ray Society I discussed the radiological signs of gastric carcinoma, and held the one pathognomonic sign to be the deformity—the filling deficiency which must interrupt peristaltic waves and have lessened flexibility, and which is usually tender and sometimes painful.

One year ago, before the same society, the same test was applied to peptic ulcer, both gastric and duodenal, that is, deformity is the one unfailing evidence upon which to base a diagnosis of ulcer, granting that we are not expected to differentiate as to malignancy in doubtful cases. To grant this is obviously fair, as the roentgenologist should not be required to do that which the surgeon and pathologist are often unable to do with the gross specimen in their fingers, but frequently they have to make microscopic sections for final decision as to malignancy.

In a paper [3] before this society at the last annual meeting, December, 1921, Carman in discussing errors in the roentgenological diagnosis of duodenal ulcer, makes this statement: "Laying aside the various minor and indirect signs of duodenal ulcer there are but two trustworthy indications of this lesion. They are deformity of the duodenal contour and the combination of retention and hyperperistalsis in a large but otherwise normal stomach."

With this I have no contention ex-

cept that I am willing to subtract the latter of these two and place the entire responsibility on the former, that is, the deformity of the duodenal contour, and let the principle equally apply to the gastric contour in gastric ulcer as well.

Frequently in these conditions there is such marked obstruction either mechanical or spasmodic that relaxation of the pylorus is much delayed and difficult to accomplish, but usually with the exercise of sufficient patience and with vigorous manipulation, and sometimes right oblique recumbent posture, sufficient relaxation can be affected to allow visualization which will lead to a clue. The writer recalls two cases in which relaxation was never seen in both of which cases a diagnosis of carcinoma was made. One proved to be a case of gall stones, the other a dense mass of adhesions around the duodenum. These and other errors have lead to our present contention of insisting upon the deformity.

These deformities, whether on the gastric or duodenal side of the pylorus are of many types. the niche, the pocket, the cauliflower-like perforation, the induration, the slight excavation and others. The meniscus recently described by Carman has not come under my observation. These deformiities may occur in any portion of the stomach, but the large majority are found on the lesser curvature and in the pyloric end. In the duodenum perhaps 95 per cent or more are in the first or bulbar portion. In our series only one other was found. and it was in the second portion of the duodenum and produced a marked obstruction. There are spastic manifestations, incisura, hypoperistalsis and hyperperistalsis, retentions and other signs of contributory nature, when properly interpreted, but if unaccompanied by deformity it will be questioned as to whether they are dependable. If so. to what extent and in what types? There are those who claim that 25 per cent of duodenal ulcer diagnoses and a certain number of gastric ulcer diagnoses are made on indirect signs. And, of course, there are a fair number of superficial lesions, mucous erosions and slits which manifestly do not give rise to luminal contour deformity. and are not detectable by any means except direct inspection. There is another class in which the ulceration has involved the deeper structures, but on account of their location they are difficult and sometimes impossible to identify roentgenologically.

In the gastric cases deformities are due to perigastric adhesions, pressure from abdominal tumors, especially the pancreas, liver, gall-bladder and other neighboring organs, spasticities of intrinsic and extrinsic origin, cicatricial contractions, perforations, etc. In the duodenum these occur at the base, the apex, the anterior or posterior wall, greater or lesser curvature, and are due to causes the same as enumerated for gastric ulcer.

Our most serious difficulties are encountered in those patients who are suffering with chronic gall-bladder disease, especially those broad, thick individuals in whom this seems most likely to occur, where as a rule the stomach assumes a high oblique position and the duodenum turns abruptly backward or to the right behind the antrum, and many times, too, the bulb is involved in a mass of adhesions, all of which makes it not only difficult to effect relaxation of the pyloric sphincter, but very difficult to visualize as well, since under these circumstances the bulb empties so rapidly. In such a case we turn the patient to the right or left anterior oblique, and, failing in both these, to the left postero-anterior oblique position, constantly manipulating with the hand. Failing in all these maneuvers we have the patient lie on the trochoscope on the right side, in which position we again manipulate, turning him about as seems indicated. The rewards for the expenditure of this time and effort have been sufficient to amply justify it and make us less dependent upon indirect signs. There are cases, to be sure, which in spite of all such measures are indeterminate. But as compared to the strictly radiographic method the fluoroscopic method is much less expensive both as to time and materials, and the results in our opinion are equally reliable.

As to the drainage time, in our experience it is a sign of only minor importance for diagnosis of organic lesions. We have seen many cases of frank pathology, both in stomach and duodenum, confirmed at operation where the drainage time had been well within six hours. On the other hand, we have seen many cases with drainage time well beyond six hours, up to twenty-four hours, go to the operating table for various abdominal conditions, but in whom no gastric or duodenal pathology could be found (24 hour retentions).

We were interested some time ago in examining 100 people in whom there were no symptoms referable to the gastro-intestinal tract. These were people in good health and in active business. There were included doctors, nurses. stenographers, bookkeepers, record clerks, janitors, cooks, waitresses, yard-men, and other employees of the institution. We observed very stringently the condition that there be no gastro-intestinal symptoms and used the identical technique that we used with patients. These observations convinced us that gastric drainage frequently goes beyond the six hour limit in well people, and that it is dependent upon the general muscle tonus, the habitus, etc., as well as upon spasticity or organic pathology. We were also impressed with the fact that the position of the organ is a matter of habitus, tonus and intra-abdominal pressure. In several of these people of tall, slender stature, the lower border of the stomach reached to the level of the pubis and yet the organ drained itself within the average time, which in these 100 proved to be four and one-half hours. Thus, it would seem that we scarcely know where we stand in the diagnosis of a given case unless we can demonstrate a pathological lesion by positive deformity.

We have also recently been interested in a variation from the usual technique in that we have given the patient a glass of bariumized milk along with the normal breakfast, that is, the breakfast which they have been accustomed to eating, whatever it might be. To date we have handled 257 patients on this basis. They are asked to abstain from further food or drink except a sip of water until the sixth hour observation. at which time the stomach is fluoroscoped for drainage and the usual bariumized milk meal repeated for determination of organic pathology. There has been no apparent difference in the drainage of this meal of mixed diet and the strictly milk or liquid meal.

It so happens that we have classified 63 cases of peptic ulcer in these 257 patients as follows: Gastric ulcers 14, duodenal ulcers 49, of which number 13 have been operated upon and, fortunately, all confirmed. No special credit is intimated, for there is perhaps no special advantage from a diagnostic standpoint in this method, but it is certainly pleasing and much more comfortable to the patient and is perhaps in every sense reliable.

We have found some interest in the fact that, in our clinic, ulcer of the duodenum occurs more frequently in males than in females. In this duodenal ulcer series of 237 cases there are 172 males to 65 females. In the gastric ulcer series of 126 cases there are 88 males to 38 females. A comparison of the relative occurrence of gastric and duodenal ulcer in the two sexes is given in the following table:

	Gastric	Duodenal
Both Sexes.....	126	237
Females	38	65
Males	88	172

Several cases have been encountered in which a double lesion was suspected and such opinion expressed, in one of

these both the gastric and duodenal ulcer were demonstrated at operation. In three others we recall the lesion was single and in an analysis of separate lesions would count against percentage of confirmation but classed as peptic ulcer would favor percentage of confirmation. Scar tissue contractions, adhesions and reflex spasms are responsible for these failures. Gall-bladder adhesions involving the duodenum are another source of error, as is also a dilated duodenum. Carcinoma of the pancreas has been mistaken by us for gastric pathology in at least two instances.

Among the 2,481 patients regarding whom we offered a negative opinion, five records exist in which peptic ulcer was found at laparotomy. One of these was gastric and four were duodenal. One of these had been examined twice and symptoms were so characteristic that exploration was advised by the surgical staff but declined by the patient. The patient returned to the hospital in less than thirty days, moribund, and at autopsy perforated duodenal ulcer was found. One duodenal case was examined twice, the first time the findings were questionable, the last time negative. Perforation, hemorrhage, obstruction, malignant degeneration and the disabling effect of long continued limitation of diet, are serious and unfortunate complications. As to malignant changes we have no direct evidence to present, but there is much argument to support the claim. For these and other reasons a large proportion of peptic ulcer cases are considered surgical and we are happily so situated that our surgeons always notify us when a case is to have laparotomy. This privilege has been of as much assistance to us in finding the causes of our errors and confirming our opinions as perhaps any single factor. A comparison of the roentgenological evidence, with the findings at operation, serve as the basis for the following table:

PEPTIC ULCER

	Gastric	Duod.	Total
Cases	126	237	363
Operations	31	80	111
Confirmations	29	76	105
Percentage Confirmations			94.5

The operative records also reveal two cases which were not submitted to x-ray study, one was an acute perforated gastric ulcer, the other a duodenal ulcer associated with a cholecystitis.

CONCLUSIONS

1. We do not believe that 100 per cent peptic ulcer diagnoses can be made either positively or negatively by any method.

2. We do not claim to differentiate pathologically in doubtful cases.

3. We cannot forecast the mortality rate.

4. We believe that persistent, careful and conservative gastro-intestinal radiology is worth more than 90 per cent in eliminating or confirming organic diseases.

5. Indirect signs stimulate more careful search and are of contributory value only. The deformity of stomach and duodenum is the one evidence upon which the diagnosis is based.

6. A sane and sensible correclation of the roentgen ray with other methods is the path which leads to conservation of the highest interests of our patients and to the greatest credit of the medical profession.

FOOTNOTES

(1) Am. J. Roentgenol. 7:523, Nov., 1920.

(2) Richard Behan, *Pain.* Appleton & Co.

(3) J. Radiol, 3:163, May, 1922.

Bone Diseases---Osteoporosis or Lipomasia from Fixation and Non-Use*

(Second Report on the X-Rays of the Final Result)

JOSEPH COLT BLOODGOOD, M. D.
Baltimore, Maryland

SINCE the first article was published (J. Radiol., 3:403, Oct., 1922), I have received the x-rays of the present condition of the involved bones in Cases 1 and 2, and as they still show definite changes in architecture and as the patients are clinically well with complete restoration of function in the knee-joint, it seems important to make the first article complete, to record the fact and to reproduce the x-rays.

Case 1—(Pathol. No. 15865)—The first x-rays of this patient of Dr. Ramy of El Paso, Texas, were taken in 1914; these have been lost, but were strikingly similar to those in Case 2 (Figs. 1 and 2). This patient has just sent me the x-rays of the present condition, eight years later.

Figs. 1 and 2 show the contrast between the lower end of the femur, the upper end of the tibia and fibula of the knee previously affected and the uninvolved side. The irregular markings of darker shadows suggest excessive new bone formation, that is, the old area of osteoporosis has now become osteosclerosis, but the architecture of the involved area has not been restored to normal. The contrast between the normal and the abnormal in the lateral views is shown in *Figs. 3 and 4*. Although I requested x-rays of the ankle in this case they were not sent.

Case 2—(Pathol. No. 23881)—Patient of Dr. K. H. Beall of Fort Worth, Texas. This patient was observed in 1918, four years ago, and the lateral and anteroposterior views of the affected knee are reproduced in Figs. 1 and 2 of the October article.

Figs. 5 and 6 contrast the normal and the abnormal in the lateral views of the knee-joint. The old areas of osteoporosis show undoubted lines of osteosclerosis. The architecture of the affected bone has not been restored to normal.

In the anteroposterior views of the two knees *(Figs. 7 and 8)* the changes in the architecture and the sclerosis are not so marked as in the lateral view.

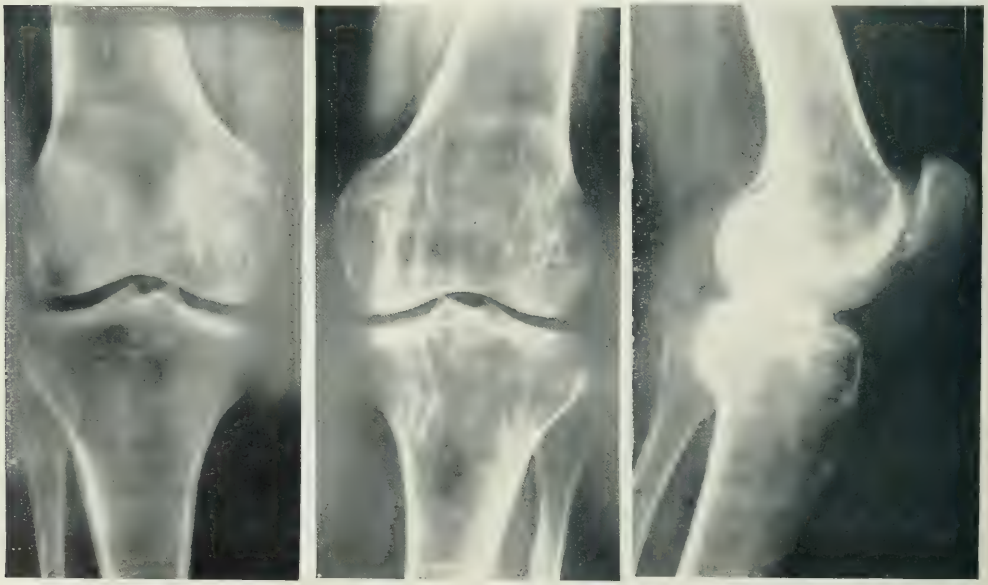
The most remarkable feature is the architecture of the lower end of the tibia and fibula and the tarsal bones. These show the same changes, in contrast to the normal, as the x-rays of the knee-joint. These x-rays of the ankle-joint *(Figs. 9, 10, 11 and 12)* which show the end result four years after the injury and non-use, should be compared with Fig. 5 (Case 3) in the October paper, which shows osteoporosis in its recent state.

Here we have evidence, therefore, that this diffuse osteoporosis from non-use, when it heals, is not restored to normal.

Should a patient come under observation because of recent pain or injury, and an x-ray be taken, pictures of this kind might be revealed if there had been a previous injury and a long period of non-use. One, therefore, should always question closely and record the evidence of previous injuries, fixation dressings and non-use. Cases of this kind would have an important bearing in industrial and accident insurance and workman's compensation.

I have in preparation now a paper to be published in this journal on the ultimate healing of the different diseases of bone, whether operated on or

*—Received for Publication October 17, 1922.



Figs. 1 and 2 (Case 1, Pathol. No. 15865)—X-rays anteroposterior view eight years after onset. Clinically well.

Figs. 3 and 4 (Case 1, Pathol. No. 15865)—X-rays of lateral view eight years after onset. Clinically well.

not, and of latent, unhealed lesions, and their correct interpretation, and there will be soon published in Minnesota Medicine a paper on the *Unhealed or Latent Benign Bone Cyst.*

I take the opportunity here to request readers of the journal to be on the lookout for osteoporosis following fixation and non-use after injury to bone or joint.

We should ask ourselves the question: "Does this always occur, as in the three cases reported in the first paper?" We now know that in at least two cases the osteoporosis present in the joint-ends of bone about the injured knee had occurred as well as in the bones of the ankle on the affected side. We now know that, although joint function is restored and the patients are clinically well, yet the x-ray of the result shows that the architecture of the bone is not restored to normal and it suggests osteosclerosis.

Why is it present only in the joint ends and not in the shaft? If any of the readers have x-rays of cases of this kind, I would be glad of an opportunity to study them.

Differential Diagnosis From Tuberculosis

I mentioned this in the first paper. Since then it has been given further thought and study. I cannot find an example of tuberculosis with such extensive softening (osteoporosis) in the joint ends of bone as pictured in these cases without some destruction and perforation of the cortical bone. In the three cases observed by me and reported here, there is no destruction of the cortical bone to be made out, although it is thin. I cannot find a case of extensive tuberculosis of the bones of a joint without evident joint involvement in the x-ray and on palpation, absent in the three cases reported here.

Again, in tuberculosis, the epiphysis may be extensively involved without involvement of the shaft. Here the shaft is involved as well as the epiphysis, although the osteoporosis does not extend far into the shaft.

Differential Diagnosis From Metastasis and Multiple Myeloma

I mentioned this in the first paper and restudy confirmed the statement there made.

Two recent cases of cancer of the oral cavity in which the tumor infiltrated to the bone demonstrate that we are not familiar with the changes which take place in the x-ray picture of the lower jaw after extraction of teeth and in patients who have not plates. In one case, that of a man aged 74, whose teeth had been extracted many years ago, and who had worn a plate, the shadow of the marrow cavity of the lower jaw about the shadow of the inferior dental canal was different from normal. It either was osteoporsis or carcinoma. It was interpreted by one roentgenologist as carcinoma, but exploration of the bone revealed no carcinoma.

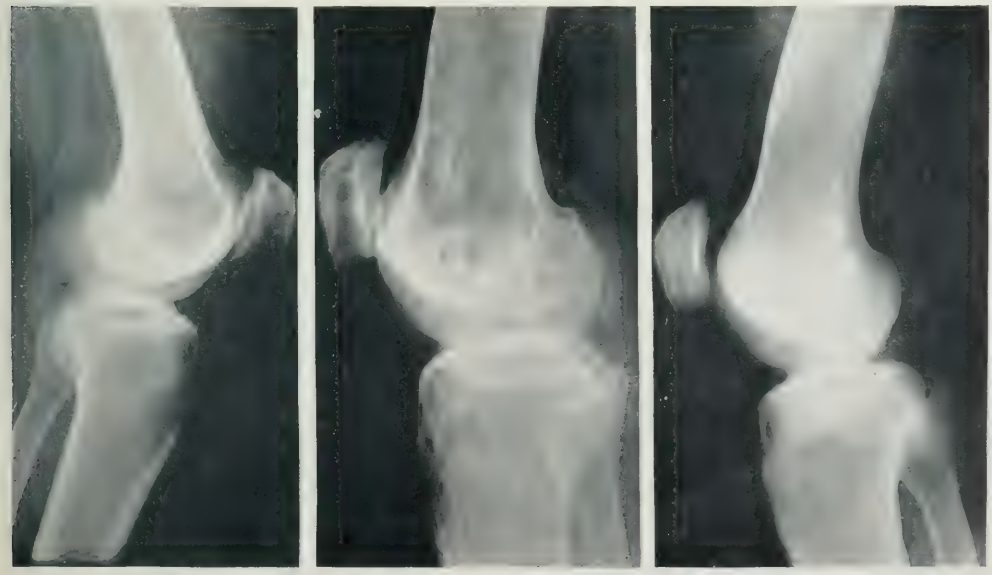
In the second case, there had been an extensive cancer of the lower lip; it was excised. In about six months a nodule formed on the jaw in the region of the mental foramen on the left side. The x-ray shows that the mental foramen is larger and irregular and about this shadow is another larger irregular softened area in the lower jaw. This was interpreted as carcinoma, and at operation we demonstrated the direct growth of cancer from the nodule on the jaw through the foramen into the marrow cavity of the jaw.

I have a paper now partially completed which will comprise a study of the central tumors of the lower jaw and their x-ray pictures.

I would be very thankful to any roentgenologist who reads this article if he would send me x-ray pictures of the lower jaw showing changes from normal in which there has been no clinical evidence of disease. The number of x-rays of the lower jaw in my collection from which all the teeth have been extracted is very small.

Conclusions

These few carefully studied cases demonstrate that there is a field for investigation in x-ray studies of the changes in bone after contusion and after prolonged fixation and non-use, and these x-rays should not only picture the bone shortly after the injury, but at intervals throughout a long period of observation.



Figs. 5 and 6 (Case 2, Pathol. No. 23881)—Lateral views of affected and non-affected knee four years after onset. Clinically well.

Footnote—November 6, 1922.

Dr. Emil G. Beck of Chicago has written me Nov. 4th as follows: "Your article in the Journal of Radiology on osteoporosis came at an opportune time as I had two cases under observation. One, an injury to the knee, showed osteoporosis four months after fixation in plaster, and the other a similar picture.

"Your suggestion of treatment is good, both patients are now walking and have improved. I have watched the development under mobilization, in fact the more I mobolize the worse the condition."

Quite recently Dr. Hoke of Atlanta sent an x-ray and a history with a possible diagnosis of tuberculosis of the knee. The x-rays show the diffuse osteoporosis of all the bones of the knee joint and in the few weeks since mobilization was discontinued and the patient urged to walk, pain is disappearing and function is returning.

I urge all who see cases of this kind to take an x-ray picture of all the joints. In all of my cases so far investigated the ankle joint on the involved side had the same picture of osteoporosis as the affected knee. This would exclude tuberculosis.

Figs. 7 and 8 (Case 2, Pathol. No. 23881)—Antero-posterior views of normal and affected knee four years after onset.

Figs. 9 and 10 (Case 2, Pathol. No. 23881)—Lateral view of normal ankle and ankle on the affected side four years after onset.

Figs. 11 and 12 (Case 2, Pathol. No. 23881)—Antero-posterior views of ankle on normal and affected side four years after onset.

EDITORIAL

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ANNUAL MEETING

Hotel Statler, Detroit, Michigan

December 4, 5, 6, 7, 8, 1922

Program Annual Meeting

TUESDAY MORNING—DECEMBER 5TH

9:00—"Report of An Unusually Interesting Case"—Howard T. Plank, M. D., Chicago.

925—W. A. Quimby, M. D., Wheeling, W. Va.

9:50—"Lung Abscess"—Le Roy Sante, M. D., St. Louis.

10:15—"Congenital Partial Giant Growth"—W. E. Hart, M. D., Decatur, Ill.

10:40—"X-ray Study of Children's Lungs"—John McRae, M. D., Ashville, N. C.

11:05—"Tuberculous Bone Lesions"—Currie J. McMillan, M. D., Winnipeg, Canada.

11:30—"Further Observations on the Use of the X-ray in Mastoid Diagnosis"—Isaac Gerber, M. D., *and* F. Nolton Bigelow, M. D., Providence, R. I.

TUESDAY AFTERNOON—DECEMBER 5TH

1:30—"Practical Problems in Administering High Voltage X-ray"—Robert H. Millwee, M. D., Dallas, Texas.

2:00—"Essential Differences in the Technique Between Superficial and Deep Radiation Therapy"—Henry Schmitz, M. D., Chicago.

2:30—"Combined Surgical and Radiological Treatment of Cancer of the Breast"—Rollin H. Stevens, M. D., Detroit.

3:00—"The Relative Value of Unfiltered Radium Emanation in Deep Therapy"—Douglas A. Quick, M. D., New York.

3:30—"The Practical Application and Technique of the Higher Voltage X-ray Radiations, with Special Reference to the Advantages of the New Form of Apparatus Employed"—E. C. Ernst, M. D., St. Louis.

4:00—"The Radiation Treatment of Hodgkin's Disease with Reference to Mediastinal Involvement"—A. U. Desjardins, M. D., Rochester, Minn.

4:30—"Is Treatment of Cancer with Radio-Active Substances a Failure?"—Emil Ries, M. D., Chicago.

5:00—"A Discussion of Untoward Results in Deep Roentgen Therapy"—James T. Case, M. D., Battle Creek, Mich.

TUESDAY EVENING—DECEMBER 5TH
(8:00 P. M.)

Joint Meeting.....Wayne County Medical Society

"The Roentgenologic Signs of Colonic Cancer"—Russell D. Carman, M. D., Rochester, Minn.
A. J. Ochsner, M. D., Chicago.

WEDNESDAY MORNING—DECEMBER 6TH

9:00—"Multiple Peptic Ulcers"—Milton M. Portis, M. D., *and* Sidney A. Portis, M. D., Chicago.

9:25—"Gastro-Intestinal Foci of Infection in Chronic Deforming Arthritis; Radiological Study of Two Hundred Cases"—L. J. Carter, M. D., Brandon, Canada.

9:50—"The Four Projection Examination of the Nasal Accessory Sinuses"—Edward S. Blaine, M. D., Chicago.

10:15—"Roentgen Analysis of the Right Diaphragm in Health and Disease"—Edward H. Skinner, M. D., Kansas City, Mo.

10:40—"Diaphragmatic Hernia; Non-Traumatic, with Report of Four Original Cases"—E. H. Kessler, M. D., St. Louis.

11:05—"The Relative Value of X-ray Evidence in the Diagnosis of Duodenal Ulcer"—C. D. Enfield, M. D., Louisville, Ky.

11:30—"Sinus Disease and Lung Infections"—H. Kennon Dunham, M. D., *and* H. John Skavlem, M. D., Cincinnati, Ohio.

WEDNESDAY AFTERNOON—DECEMBER 6TH

1:30—"Gleanings from a Medical Scrap Basket"—Truman Abbe, M. D., Washington, D. C.

1:55—"Relation Between Surgery and Radiation Therapy"—Burton J. Lee, M. D., New York.

2:20—"X-ray Therapy of Cancer"—E. L. Jenkinson, M. D., Chicago.

2:45—"The Therapeutic Uses of X-rays Other Than on Malignant Growths"—William L. Ross, M. D., Omaha.

3:10—"The Importance and Necessity of Minimizing Diagnostic Errors by Repeated Roentgen Examinations"—William J. Cassidy, M. D., Detroit.

3:35—"Objections to the Use of the 'One Lethal Dose Method' in Malignancy"—C. H. Nimms, M. D., Hot Springs, Ark.

4:00—"Pulmonary Abscess, Roentgenographically Considered"—William H. Stewart, M. D., New York.

WEDNESDAY EVENING—DECEMBER 6TH

8:00—"Roentgenological-Pathological Conference"—Preston M. Hickey, M. D., Detroit, *and* Aldred Scott Warthin, M. D., Ann Arbor, Mich.

8:45—"A Study of Irradiated Moles with an Attempt to Discover Histological Criteria of Irradiation"—James T. Case, M. D., Battle Creek, Mich., *and* Aldred Scott Warthin, M. D., Ann Arbor, Mich.

THURSDAY MORNING—DECEMBER 7TH

9:00—"The Progression of the Chest and the Determina-

tion of the Normal"—W. W. Wasson, M. D., Denver.

9:25—"The Importance of Oblique Films in the Study of the Thorax"—James S. Pritchard, M. D., Battle Creek, Mich.

9:50—"Radiography in the Examination of the Urinary Tract"—C. G. Sutherland, M. B., Rochester, Minn.

10:15—"The Relationship of Roentgenology to Urology"—John R. Caulk, M. D., St. Louis.

10:40—"Radiological Signs of Endocrine Disorders"—William Engelbach, M. D., St. Louis.

11:05—"Some Organization Problems and Possibilities"—Warner W. Watkins, M. D., Phoenix, Ariz.

11:30—"Surgery and Radiotherapy, An Indispensable Combination"—Paul Eisen, M. D., Detroit.

THURSDAY AFTERNOON—DECEMBER 7TH

1:30—"The Effects of X-ray on Gastric Secretions"—Andrew C. Ivy, M. D., B. H. Orndoff, M. D., *and* A. Jacoby, M. D., *Dept. of Radiology and Physiology, Loyola University, Chicago.*

2:00—"Further Studies in Radiation Doses"—Francis Carter Wood, M. D., New York.

2:30—"Twentieth Century Advances in Cancer Research"—Erwin F. Smith, Sc. D., *Chief of Laboratory of Plant Pathology, Bureau of Plant Industry, U. S. Dept. of Agriculture.*

3:00—"The Roentgen Ray in Gynecological Cases. A Clinical Study"—Elizabeth M. Hanks, M. D., Chicago.

3:30—"Carcinoma of An Aberrant Thyroid"—A. F. Tyler, M. D., Omaha.

4:00—"The Operation of High Voltage X-ray Tubes"—W. D. Coolidge, Ph, D.. Schenectady, N. Y.

4:30—"The Retardation of Tumor Growth by Pregnancy"—Maude Slye, Ph. D., Chicago.

5:00—"Measurements of Radiation from American Deep Therapy Machines, with Special Reference to the Duane Method of Measurements"—George E. Pfahler, M. D., Philadelphia.

FRIDAY MORNING—DECEMBER 8TH

9:00—"Pericarditis with Effusion"—Fred M. Hodges, M. D., Richmond, Va.

9:25—"A New Technique for the Positive Identification of the Sphenoid and Ethmoid Cells—Amedee Granger, M. D., New Orleans.

9:50—"Roentgen Diagnosis of Lesions of the Maxillary Bones"—Kurt H. Thoma, D. M. D., Boston.

10:15—"X-ray Evidence of Sacro-Iliac Pathology"—Preston M. Hickey, M. D., Detroit.

10:40—"The Radiability of Gall Stones, Based Upon a Study of a Series of Surgical Cases"—Leon T. LeWald, M. D., New York City.

11:05—"Diagnostic Errors Disclosed by Bismuth Paste Injections"—Emil G. Beck, M. D., Chicago.

11:30—"The Differential Diagnosis and Treatment of Central Lesions of Bone"—Joseph Colt Bloodgood, M. D., Baltimore.

FRIDAY AFTERNOON—DECEMBER 8TH

1:30—"Comparison of Measurements of Intensity and Hardness of X-ray Produced by Different Types of American Transformers"—Albert Bachem, Ph. D., Chicago.

1:55—"The Design of Potter Bucky Diaphragm Grids"—R. B. Wilsey, Ph. D., *Research Laboratory, Eastman Kodak Company,* Rochester, N. Y.

2:20—"General Considerations in the Application of Radium"—William H. Cameron, M. D., Pittsburg.

2:45—"Radium in Sarcoma"—H. B. Aiken, M. D., Toronto, Canada.

3:10—"Toxic Thyroid with Physiological Findings After Radium Treatment"—R. E. Loucks, M. D., Detroit.

3:35—"Radiation Therapy in Advanced Malignancies"—C. A. Donaldson, M. D., Minneapolis, Minn.

4:00—"The Effect of Radium and X-ray on Live Malarial Plasmodia"—Leon J. Menville, M. D., New Orleans.

4:25—"The Essence of the Action of X-rays and Rays of Radium on Cells"—E. Pohle, M. D., Frankfort, a.M., Germany.

4.50—CASE REPORTS—Carl C. Birkelo, M. D., Detroit.

1—Calcification of the Kidneys, with No History of Tuberculosis.

2—Classification of the Visceral Pleura.

3—An Extensive Atrophic Arthritis in Both Feet.

4—Bilateral Calculi in the Fallopian Tubes.

5—Congenital Dislocation of the Hip Joint with Large Exostosis of the Neck of the Femur Extending Into the Acetabulum.

The Profession and the Public

DR. DESJARDINS in the October issue of the Journal touched upon one phase of the relationship of medicine to the public and in the November issue another phase was discussed.

This number deals with the fundamental principle of cooperation of the individual medical man with his professional brothers and with the lay public.

It is necessary in any discussion of this relationship to get certain fundamental facts in mind, and among these is the truth that medicine includes all phases of the healing art. Whatever has to do with the prevention of disease, the treatment of the sick and the promotion of euthanasia is included in the practice of medicine. This viewpoint was established long ago in the older civilations of European countries, but in our newer country, with its consequent bourgeois thinking, such definite conclusions have not been reached.

Early in the history of the United States the profession of medicine became split up into several schools, due to a difference of opinion regarding certain therapeutic methods. For a time these various schools flourished. During their period of affluence they fought each other bitterly. In more recent years medical men have realized that this division of their own ranks has led to confusion of thought on the part of laymen and has, at the same time, weakened the ranks of the profession itself.. So at the present time we hear little or nothing about allopaths, homeopaths and eclectics, but the medical profession is spoken of as a unit.

We are still beleaguered by a host of therapeutic enthusiasts such as the osteopaths, chiropractors, Christian Scientists, etc. That many of these advocates of certain forms of therapy have realized their mistaken viewpoint is evidenced by the fact that they have begun to raise the standard of requirements for the practice of their art.

The osteopaths have in recent years lengthened their course of instruction to four years, and even advise one year internship before actual practice. This is a great step in advance of two courses of a few months each, which was at one time all that was needed.

The chiropractors in Nebraska are now in a bitter fight among themselves, due to a difference of opinion as to the necessary requirements for licensure. One group thinks that the present requirements are good, but advises making them better. The other group is struggling to make the requirements for licensure even lower than they now are.

The Christian Scientists, so far, have eluded the necessity of license to practice. They just do it anyhow. We frequently think of the truism of Mr. Dooly, who said some years ago: "If the Scientists had a little more science and the doctors a little more Christianity, it wouldn't make much difference which you had so you had a good nurse." There is good philosophy in this jest.

The sum and substance of it all is that a broad viewpoint on the part of the medical profession is necessary to meet the thought of present day laymen. Tolerance, coupled with recognition of the fact that laymen want medical information, will bring the best results.

Ample evidence of the thirst of laymen for medical knowledge is everywhere at hand. This paper is being written while preparation for "Cancer Week" is under way, so that illustration forces itself upon us. Many medical men will testify that the whole population of the town, from children in arms to white haired, feeble, old men walking with canes, come to hear about cancer. The schools are dismissed that the children may learn, the women's clubs come in a body, the sewing circles and the men's clubs all turn out to hear and sit with rapt attention through the whole demonstration.

This attitude of the public toward medical facts makes one thing very clear, namely, that the profession itself has been derelict in its duty to the public. Quacks will always be among us, but when medical facts are known to the layman who will deny the deterrent effect which his action then will have upon the unscrupulous members of the profession?

The practice of medicine is still a personal service, and honest, well informed and well directed service will ultimately bear fruit. Backbiting and jealousy should have no place in the make up of the physician. The majority of physicians have the confidence of their constituents. They are still consulted about many things not definitely medical in character. Laymen have a right to this sort of knowledge and justly look to the medical profession for it. Because this is their right, and because every man has a right to exercise his franchise, the people will be the ultimate judges as to what shall be the status of the medical profession in the commonwealth.

The medical profession as a whole, then, and the individual physician in particular, has a great opportunity, but this opportunity brings with it a great responsibility. Either the medical man must meet this responsibility or "be weighed in the balance and found wanting."

That the outstanding members of the medical profession see this responsibility is amply proved by glancing through current medical literature. To quote from Dr. John M. T. Finney, Annals of Surgery, September, 1922, in an article entitled "The Opportunities and Responsibilities of the Surgeon": "One has but to look around in our own country, as well as abroad, to see on every hand evidences of social unrest and mutual distrust between classes and nations. * * * In such a crisis as confronts us at this moment, to whom is society to turn for aid and guidance? From what other source can a satisfactory solution of its manifold and perplexing problems be found than from its educated, thinking men? We, as members of this favored class, to whom much in the way of opportunity has been given, owe much to society in return. In a strictly professional way we may have fulfilled this responsibility, some perhaps in large measures. But in the still larger sphere of good citizenship, of sharing in the responsibilities of the government, of making our influence felt upon the side of civic righteousness, we have, as individuals, or as a profession, little to show in the way of accomplishment. We must plead guilty to the charge frequently made against us, namely, lack of interest. In response to a fine professional consciousness, overjealousy guarded, perhaps, we have stood too long aloof from active participation in public affairs, and have left to others, not always so disinterested, the management of civic matters, of great importance to us as individuals, to the communities in which we live, and to the nation. * * * Yet all the while we are deploring existing conditions and the lack of intelligent public opinion which would render such things impossible. Physicians should exert their moral force by actively interesting themselves in municipal, state, national and international affairs, not casting precedent entirely to the winds, but, on the other hand, not so firmly bound by it as to prevent them taking their proper place in society and accepting and discharging their full share of the responsibilities of citizenship. * * * Those physicians and surgeons will do most to promote the advance who first do the best practical, technical work of which they are capable, and, secondly, exert their influence, wherever possible, toward the better organization of society as a whole. * * * There are many problems now engaging national and international attention in the solution of which the medical profession could render service of incalculable value to mankind. The weight of its united opinion could, for instance, satisfactorily determine the settlement of public health measures now under consideration, for example, the supervision and control of food supplies, urban and rural sanitation, child, school, personal, social and industrial hygiene, to which may be added many kindred subjects that affect community life."

There is indeed a heavy responsibility laid upon the medical profession. It is necessary to keep the vision clear, the face forward and the head erect to meet such a demand. Only by cooperation with other members of the profession and with the laymen in each community, can the greatest good be gained for the individual physician, for the profession as a whole, and for the commonwealth.

Medical Research

A COMPARISON of the medical literature of fifty to one hundred years ago with that of the present day furnishes convincing proof of the evolution of medical practice. Particularly noticeable is the increasing recognition of the importance of scientific research in its relation to medical science. Medical practice half a century ago was looked upon as an art. Today it is recognized that the practice of medicine is a science humanized by artful application to the human family.

It is probable, therefore, that much of the carping of some of the medical litterateurs is the natural result of the development to which reference has just been made. It is easily understood how the man who looks upon the practice of medicine strictly as an art should cavil at the exactions of medicine as a science.

But it seems safe to assume that no matter how much one may refuse to sanction the change, it has progressed too far to be abandoned or refuted willy nilly. Wherefore, it seems neither wise, nor in keeping with an honest regard for the large responsibilities impressed on scientific research as applied to medicine by a complex social order, to deny or try to evade the value of concerted and organized effort. Such a mental attitude is in effect to assume that science is not susceptible of discipline, which, if it were true, would be to say that science is an empty shrine more deceptive and hopeless in its professions than the professions of the most fatuous of religious dogmatists.

There is nothing to controvert, and everything to support the view that organized science, in medicine as well as elsewhere, will prove the greatest achievement in the history of the world's progress. As it would also seem to be indisputable that such an accomplishment would prove stimulative

rather than perversive of that intensity of individual effort deemed so essential to science and scientific research.

Organization of individual effort, whether applied to scientific research or to other lines of human endeavor, has already proven its worth. And it hardly seems open to question that such a schematic way of attacking the many problems to which the human family is demanding answer will clarify rather than add to the jumble and jargon of strict individualism. It will, to say the least, provide a check of practicality and bridle that desire for fame which leads many to the publication of reputed scientific findings before proper grounding has been established.

For this, if no other reason, the medical profession by and large should actively support scientific research. Reduced to a purely selfish statement, the medical profession will have before many years to meet the present trend intelligently, recognize its powers for good, and make the utmost of its possibilities, or be trod under the unsympathetic heel of public opinion.

The practitioners who are devoting their attention to the science of radiology are today pressed by many questions which must sooner or later be scientifically determined. Two fundamental propositions must be admitted: (1) that these questions will not be taken up and studied seriously until there is an apparent sincerity of desire on the part of radiologists to find the answers; and (2) that research workers undertaking the solution of these problems must have tangible and visible means of sustenance in order that the flower of their thought and the consummate degree of their energies may be given wholeheartedly to the problems in hand.

Iowa X-Ray Club

THE IOWA X-RAY CLUB met at Boone, Iowa, October 4th, at which time a program was held and the following officers were elected:

President . . . . . BEN T. WHITAKER, M. D., *Boone, Ia.*
Vice-Pres . . J. R. CHRISTENSEN, M. D., *Eagle Grove, Ia.*
Secretary . . . . . D. M. GHRIST, M. D., *Ames, Ia.*

A Contribution By Queen's University

QUEEN'S University, at Kingston, Ontario, Canada, has for quite a number of years embodied in its regular curriculum a course in the physics of x-rays and x-ray apparatus. That institution, it will be recalled, is one of the oldest and most reputable universities on the North American continent. The knowledge and experience it has gained in this phase of radiology is not only authentic but valuable.

The Journal feels greatly pleased, therefore, to be able to announce to its readers that, beginning in an early issue, it will present a series written for it exclusively by John K. Robertson, Ph. D., of the Physics Department of Queen's University, dealing with the physics of x-rays and x-ray apparatus. The series will, of course, be prepared primarily for medical men, and, in order that the subject may be treated exhaustively and represent an authoritative treatise, only an elementary knowledge of physics will be assumed.

Various phases of importance will be discussed. For example, the interrupterless transformer, measurement of high voltage, induction coil, high frequency, origin of x-rays, action of the gas bulb, regulation of vacuum, the Coolidge tube, the nature of x-rays, kinds of x-rays, penetrometers, secondary rays, dosage, etc., will be considered in the belief that much of the present confusion will be eliminated.

From the preliminary sketch of this series which has been submitted to the editor, he has no hesitancy in saying that this will be a very valuable, instructive, and interesting discussion of the physical side of the science of radiology—a phase which is of basic importance to every person using x-rays either therapeutically or diagnostically.

A New Radium Enterprise

LATE press dispatches contain information which is more than passingly interesting with respect to the world radium market. On November 13th last, according to the New York Times, at a meeting held in the Colonial Museum at Brussels, under the auspices of the Societe Generale du Belgique, with King Albert of Belgium and five hundred distinguished guests present, including among the latter, state dignitaries, scientists and representatives of the medical profession, formal announcement was made confirming the rumors of the discovery of high-grade radium ore deposits in the Belgian Congo of South Africa.

It will be remembered that rumors of this discovery have been rife since 1913. The announcement continued to the effect that extensive investigation has been made into the quantity and quality of the deposits in question and that as a part of that work large quantities of the ore have been transported to Belgium for testing.

The results withal have been so satisfactory that a large reduction plant has been constructed and is now in operation at Oolen, Belgium. The plant is said to be by far the largest of its kind in the world, with a capacity exceeding the combined output of all American reduction plants of this type.

The carnotite ore deposits of Colorado have heretofore been considered the most valuable productive radium deposits in the world. The fact is several of the largest American radium concerns have depended entirely on the Colorado mines.

Because of America's experience in the mining and marketing of radium products, and due to the present condition of European finances, the Societe Generale du Belgique has solicited American counsel and aid in the development of this enterprise. As a consequence, a joint corporation has been created between the Belgian interests and The Radium Company of Colorado, which will be known as the Societe Generale du Radium. The press dispatch referred to earlier in this discussion is authority for the statement that this joint corporation will market the products of the Oolen plant all over the world. In the United States the business of this joint corporation will be conducted through The Radium Company of Colorado, which has exclusive sales rights in America of the Belgian products. It is understood that the Colorado Company will temporarily, if not permanently, discontinue the mining and refining of Colorado ores.

Representatives of the executive and technical staffs of The Radium Company of Colorado have been in Belgium since last July bringing to the satisfactory culmination already indicated the numerous details and technical problems inherent in the launching of such a vast undertaking.

According to the information given out, it is proposed to ship the entire output of the Belgian plant to the United States, where it will be distributed in suitable containers for therapeutic application. The closest sort of cooperation will be maintained with the United States Bureau of Standards and the latter will be commissioned to certify all of the radium salts offered for sale.

DEPARTMENT of TECHNIQUE

Drawings for Lantern Slide Protection

N. J. NESSA, M. D.
Sioux Falls, S. D.

Take an ordinary Eastman duplitized film and pass it through the fixing bath until the silver salt has been removed, wash and dry. This will leave a clear, transparent film with enough emulsion base remaining to hold writing. In drawing, your diagram can be treated directly on the film on squares the size of standard lantern slides—(3½x4 inches)—which now can be mounted or placed between two hinged covered glass slides and projected in the ordinary lantern glass adhesive paper along one side. This method of mounting can also be used for small objects such as radiographs of fingers, etc. India ink gives best results for reproduction.

Dr. Albert Soiland's Installation

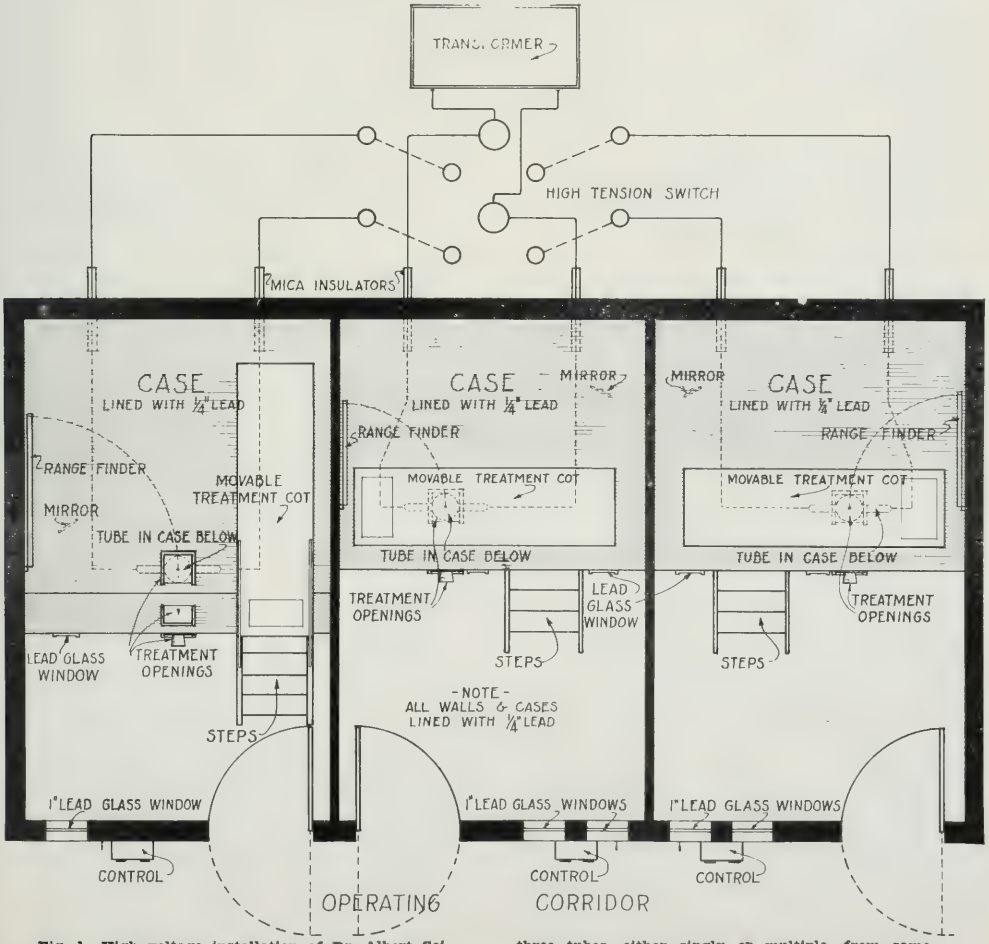
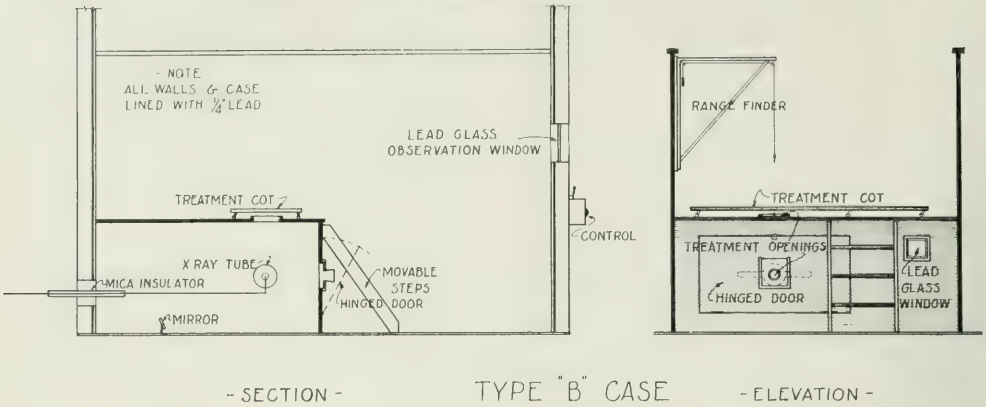


Fig. 1—High voltage installation of Dr. Albert Soiland, Los Angeles, showing connection for operating three tubes, either singly or multiple, from same generator set.



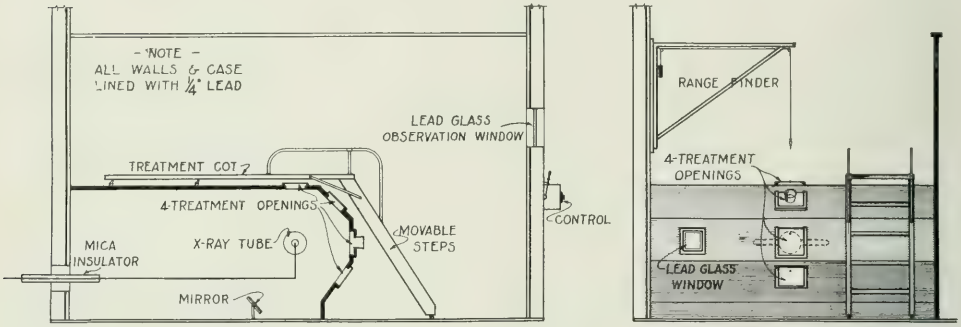


Fig. 2—Front and side elevation of tubes and tube holders, with accessory devices.

Fig. 3—Section of operating hall, showing high tension switches and voltage control.

Fig. 4—Treatment booth in lead lined cabinet.

CASE REPORTS

Carcinoma, Originating in Porokeratosis, Successfully Treated by Roentgen Rays

H. H. HAZEN, M. D.
Washington, D. C.

THE FOLLOWING case report is of special interest for three reasons. First, because the disease is an extremely rare one, not more than 60 cases have been reported in the literature; second, because this is the first recorded case where cancer has developed from porokeratosis; and third, because cases of prickle-celled cancer with gland involvement successfully treated by the roentgen rays are rather unusual.

In 1892 porokeratosis was first described simultaneously by Mibelli [1] and Respighi [2]. The best articles concerning this condition have been published by Hutchins [3], Heidingsfeld [4], Respighi and Ducrey [5], Matsumato [6] and Wright [7]. These articles contain a complete bibliography. Practically nothing is known as to the causation of the disease; although Wende [8] probably succeeded in reproducing a lesion by autoinoculation. Gilchrist [9] has reported 11 cases occuring in the same family and other writers have noted an hereditary tendency. The disease usually develops upon the backs of the hands, but may develop upon other portions of the body, especially the feet. It begins as a small lesion that resembles a keratosis. There may be one spot or there may be a number. After a considerable space of time there is peripheral extension so that round or roundish areas as much as two or three inches in diameter may be formed. They are sharply circumscribed by a raised, dark, horny edge and have a more or less atrophic center. The lining wall is very irregular in outline and through its center there is often a depression that may contain concretions. As a rule there are no subjective symptoms, but itching has been noted.

Pathologically the disease probably is a nevus. Histologically there is an early acanthosis and inflammatory changes in the corium. Later there is a hypokeratosis with plugging of the follicles and sweat ducts.

It is usually conceded that the curet and cautery are not effectual. Apparently light x-ray treatments have likewise failed. Gilchrist reports good results from excision or the use of the electric needle.

Report of Case

The patient first came under observation October, 1920, complaining of a sore hand. He was a native American from a small town in Virginia, where he was engaged in the trucking business. He was 60 years of age and according to his history he had had trouble with his hand for 30 years, but only during the past three months had it been really bad. There was no history of any similar disease in his family. His personal history was negative except that he had been much exposed to the sun. The condition of the hand at this time is well shown in the accompanying photographs from a cast made by Captain Wallis, of the Army Medical Museum. For these photographs I am indebted to Major James F. Coupal, acting Curator of the Medical Museum. Upon the dorsal surface of the hand was a raised edge, enclosing an atrophic area nearly three inches in diameter. The skin over this area was glazed, stiff, and reddened. In it were a number of small firm nodules. Just within the horny edge were three separate nodules each about one centimeter in diameter. Upon the fingers were a number of small keratotic-like areas from one-half to two cm. in diameter. Several of these contained firm, hard nodules similar to those already described. The condition upon the palm of the hand showed a slight amount of keratosis

Fig. 1—Dorsal aspect of the hand, showing the large area of skin involved in porokeratosis; also the three nodules within this area which had undergone malignant degeneration.
Fig. 2—Palmar aspect of the hand, showing extensive area of porokeratosis.

surrounded by a typical dike wall so characteristic of porokeratosis. The epitrochlear gland was about two centimeters in diameter. The axillary glands were considerably larger, both had the characteristic "feel" of cancerous glands.

The blood Wassermann was negative. Tissue removed by a cutaneous punch from the larger nodule showed prickle-cell cancer with a fair number of epithelial pearls. This type of cancer it will be remembered has been shown by McCarthy, of the Mayo Clinic, not to be so malignant as prickle-cell cancer without pearl formation. But, as the patient refused to consent to the extensive operation deemed necessary it was decided to try radiation. The first treatment was given October 28th, with the following technique: no filter, F. S. D. 9 inches, ma. 4; spark gap, 7½; time, two minutes and fifteen seconds. A treatment with the same technique except that it was but forty-five seconds long was given to the palm. The following day the axillary and epitrochlear areas were radiated through 1 mm. Al, 8½ inch gap and 4 ma. for five and one-half minutes. November 15th the same treatment was given except that the gland areas were radiated through 2 mm. Al. for six minutes. Following this treatment the atrophic areas on the dorsal surface of the hand broke down giving an area of healthly looking granulation. By December 6th this had healed in and the same treatment was repeated. On December 27th the hand had healed and all nodules had completely disappeared. The lymph nodes were treated upon this date and again on January 13th, 1922, January 31st, February 20th, March 18th and April 29th. Upon the last mentioned date the back of the hand was entirely well and the enlarged nodes had completely disappeared, but the one treatment on the palm had no effect upon the porokeratosis. Upon the back of the hand the dike wall had completely disappeared as the result of heavy treatment.

In September, 1922, this patient was entirely well without any evidence of malignancy.

BIBLIOGRAPHY

1. Mibelli: Gior. Ital. d. mal. ven. 1893, p. 313.

2. Respighi: Gior. Ital. d. mal. ven. 1893, p. 356.

3. Hutchins: J. Cutan. Dis. 14:373, 1896.

4. Heidingsfeld: J. Cutan. Dis. 23:29, 1905.

5. Respighi and Ducrey: Ann. de. dermat. et syph, 9:609 and 734, 1898.

6. Matsumoto: J. Cutan. Dis. 36:379, 1918.

7. Wright: Arch. Dermat. & Syph. 4:469, 1921.

8. Wende: J. Cutan. Dis. 16:505, 1898.

9. Gilchrist: J. Cutan. Dis. 17:149, 1899.

Hematoma of the Gastrohepatic Omentum: X-Ray Plate Suggestive of Carcinoma of the Stomach

D. DUDLEY KRUPP, M. D.
Brooklyn, N. Y.

THE FOLLOWING case, sent to our clinic for diagnosis and treatment, brings out the fact that a thorough fluoroscopic examination is important before any positive conclusions are drawn, even though a number of plates may have been made and the same constant defect noted. Nor must we omit the history of the case in the elimination of certain possibilities. The x-ray is only an adjunct to diagnosis when all the findings are brought together.

This case pointed to a history of pathology in and around the stomach, and here the symptoms were confined to the upper left hypochondriac region. Because of extreme tenderness over this area and a spastic condition of the abdominal muscles the physical examination was not very satisfactory. Urinalysis gave negative findings. Blood examination showed 9,000 white count with delayed coagulation test. The first physician called to see the case had rendered a tentative diagnosis of perforated gastric ulcer.

HISTORY

Mrs. E. H., age 32 years, married 11 years, no children or miscarriagges. Father and two brothers living, one brother died in infancy from pulmonary tuberculosis, and a sister died in infancy, cause of death unknown.

The patient has had measles, mumps, whooping cough, chicken pox, pneumonia, typhoid, influenza, tonsillitis and rheumatism. Menstruation began at the age of 15, periods are of three days limitation and painful at first. In 1913 the patient had a curettage, and also a dilatation of the cervix for sterility.

Present Complaint: Pain in the left hypochondriac region, abdomen very tender, inability to lie on the left side. On March 16th, 1921, after eating a heavy evening meal, patient had a distressed feeling in the stomach with slight nausea but no vomiting. A cathartic was taken and the bowels moved, giving some relief. On the following morning, after partaking of a little breakfast, the pain became more intense and continued all day. In the evening a physician was called, who gave her opiates, which brought relief temporarily, but the pain continued when the effect of the morphin passed off. The following day found the patient in a more prostrated condition, as the pain had returned with greater severity. The abdomen was very tender and the bowels had not moved in twenty-four hours, due perhaps to the effects of the opiates.

It was then that the patient was brought to the hospital, with a temperature of 99 and a pulse of 100. Respiration count was 22. When she arrived at the hospital after a 40 mile ride in an automobile she required support to stand for the fluoroscopic barium meal examination. The second day in the hospital she showed a normal temperature, but in the evening it had returned to 99.6. On the morning of the third day the temperature was normal, but the pain and tenderness still existed. A few hours later she was operated upon.

ROENTGEN FINDINGS

The fluoroscopic examination showed a partial hour glass contraction of the stomach in its mid-portion, with absence of peristaltic waves over this area. There was a ragged appearance on the greater curvature. The remain-

ing part of the stomach was markedly spastic. The duodenal cap could not be made to fill as there was spasticity at the pylorus. The position of the stomach was rather high in the epigastrium and could not be displaced, although the patient could stand a little pressure. This gave us a clue to adhesions holding the stomach high up to the left. As the patient could not lie on her abdomen plates were made in the upright position. These verified the fluoroscopic findings. A diagnosis was rendered of perigastric inflammation with adhesions. At first carcinoma was though present, but this was eliminated.

Operative Findings

On the lesser curvature of the stomach in the midsection, in the gastrohepatic omentum, was found a hematoma 3 by 5 cm. in area, with exudations of lymph and adhesions to the wall of the stomach. The adhesions were freed easily and the bloody mass was removed. No induration was present nor perforation of the gastric wall. The gall-bladder was negative. There was evidence of an old salpingitis, chronic pelvic inflammation, and the appendix was adherent in the pelvis.

Pathological Findings

In this tissue were found large collections of red blood cells and various forms of leukocytes. Many of these collections appeared to be enclosed within dilated blood vessels and sinuses. The tissue as a whole had somewhat the appearance of a hemangioma. One must not overlook the possibility of this tissue assuming the function of a blood making organ, a phenomenon that sometimes occurs in various forms of anemia.

Comment

Without knowing the clinical aspect of the case, it is quite evident that a diagnosis of carcinoma of the stomach would be suggested, since the plates showed some of the characteristics of this lesion. The pathological finding of a tumor mass (hemangioma) did not, in our opinion, eliminate a new growth, as hemangioma comes under the pathological classification of tumors. It was a tumor mass, but of extragastric origin. It was the adherence of the stomach in the upper left hypochondriac region when the patient was examined in the upright position that made us think that the pathology was not inside the stomach wall. If the tumor were intragastric, the position of the stomach would have varied when external pressure was applied. The only finding which may have favored a diagnosis of intragastric tumor was the lack of peristaltic waves in the constructed area. Dr. Le Wald, in a recent interview on this subject, could only suggest syphilis in addition to carcinoma as a possible lesion. In his article on the "Leather Bottle Stomach" his description of the "Dumbbell Stomach" may show a slight resemblance to my plates, but the history of the case and fluoroscopic findings are not the same. His findings of dilatation of the duodenum with rapid emptying of the stomach, are reverse to my findings of spasticity of the pylorus and a ragged appearance of the greater curvature of the stomach with delayed emptying.

Whatever our opinions were in this case prior to the operation, we believed that the right thing had been done in subjecting the patient to an exploratory laparotomy, thereby givinging her better prospects of recovery. The last report of the case stated that the patient was doing very nicely.

NEW EQUIPMENT

The DupleXray

THE ENGELN Electric Company in conjunction ith the Kelley-Koett Manufacturing Company recently produced a new and unique x-ray plant which is known as the "DupleXray." This x-ray plant is being produced on a quantity production basis in order to keep the manufacturing cost low on a highly developed product which would ordinarily command a high selling price.

This radiographic and fluoroscopic x-ray plant consists of a transformer and control with the new K-K motor-drive tilt fluoroscopic table, which permits the movement of the table from the vertical to the Trendelenburg or any intermediate position by merely turning a switch. The table can also be moved to any position, independent of the automatic control.

The table is equipped with an accurately counter-balanced fluoroscopic screen carriage, which allows the screen to be moved both in the plane parallel to the table and perpendicular to the table. The additional feature of counter-balancing the carriage so that the screen will move up and down over the patient, allows the operator more freedom when reducing fractures. The K-K Tilt Table is the only fluoroscopic table having this decided advantage. The screen also has rotational motion on its own axis so that the various positions are unlimited.

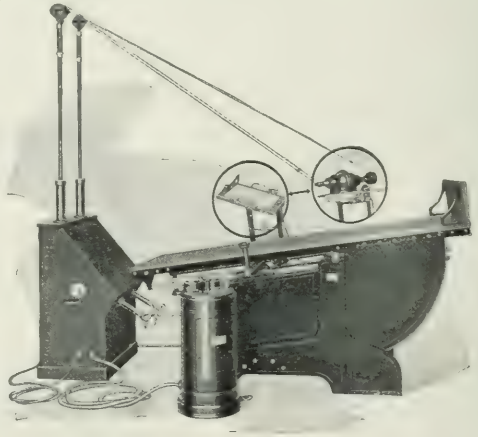
This motor-drive tilt table is not only correctly designed for convenient fluoroscopy, but is arranged so that all radiographic work may be occomplished with minimum effort. The same counter-balanced carriage which carries the fluoroscopic screen, is arranged to take a specially constructed tube arm. The tube arm has the same complete range of motion as the fluoroscopic screen, besides permitting the tube to obtain the different angles desired.

In addition to the usual method of obtaining radiographs, the Engeln Electric Company have arranged a unique and practical method of taking radiographs during the fluoroscopic examination. With this arrangement the same Coolidge tube used for fluoroscopic examination takes the radiograph. A cassette holder is attached to the back of the fluoroscopic screen so that it is merely necessary to slide the cassette into position. The control is constructed to automatically obtain the correct milliamperage and back-up for radiography by merely turning the switch handle. This is accomplished in the dark *without* moving the patient. Fluoroscopy can then be continued, if desired.

The control cabinet for operating the DupleXray is mobile. This allows its placement in the most convenient position for radiographic and fluoroscopic work. The auto-transformer voltage selector is calibrated to indicate three, four and five-inch back-up settings. This calibration means that no testing for the desired spark gap is necessary.

The well known Engeln High Tension Aerial Switch is used to obtain the high tension current to the tube stand over the table. It is mounted in the transformer cabinet and is controlled from either side. The high tension masts, extending 84 inches from the floor, are well grounded and insulated. Every part of the DupleXray is grounded where necessary so that full protection is assured. The entire construction of the DupleXray, indicating ease of operation, is naturally appreciated by the profession.

In addition to the very desirable electrical and mechanical features in the DupleXray it is very compact. This makes the problem of space for the installation a secondary consideration. Although the DupleXray is produced as a complete x-ray plant, the Kelley-Koett motor-drive tilt fluoroscopic table can be supplied separately, as it is especially adaptable to present installations.



Announcing an Intermediate Deep Therapy Machine

"SNOOK SPECIAL"

MORE than a year ago the Victor X-ray Corporation announced the Victor Deep Therapy Roentgen Apparatus, the first of its kind in this country, and with a capacity exceeding the requirements of any Coolidge therapy tube up to that time. In other words, it was designed to handle the Coolidge tube of the future with higher voltage and greater milliamperage.

Those who have installed this Victor outfit are ready to use voltages higher than 200,000 just as soon as a Coolidge tube is developed for higher voltages, which will undoubtedly be in the comparatively near future. These users will not find it necessary to re-equip in order to meet the increased requirements, for their present Victor machine is in anticipation of future developments.

There has been a persistent demand, nevertheless, for a smaller and lower priced machine with capacity limited to

200,000 volts—sufficient to energize the present Coolidge deep therapy tube —and which would also serve as a combination machine to include diagnostic service. It seems that many roentgenologists and institutions are content to confine their therapy work within 200,000 volts, for the present at least.

A new and intermediate model Victor Deep Therapy Apparatus is now available, with a maximum of 200,000 volts. This announcement is awaited by many roentgenologists who did not feel justified in making an investment in the larger machine when their plans did not take them beyond the 200,000 volt Coolidge tube of the present.

The development of this intermediate combination model began not long after the larger Victor machine was announced, in view of a possible demand for apparatus for deep therapy along the lines of the new technique and which could be utilized also for diagnostic work.

The rectifier, which is really the heart of the machine, is of the well known "Snock" cross-arm type. All of the advantages of the principles of this type of rectifier have been utilized, but in addition marked improvements in the details of the essentials of construction have been worked out, making it far superior to any Snook type rectifier ever put out, in spite of its recognized superiority in its present day form, as exemplified in the standard Snook machine.

The machine will be put out in two models—one as a straight therapy machine, the other as a combination diagnostic and therapeutic machine, both having a maximum voltage rating of 200,000 volts peak value. So far as the current rating is concerned, the transformer supplied with this intermediate model will have capacity considerably in excess of that required for the present deep therapy tube.

The machine will occupy a space of from one-third to one-half that required for the Victor large 280,000 volt machine.

The significance of this announcement is that there are now two Victor deep therapy machines available. One, the original 280,000 volt machine with which not only the deep therapy Coolidge tube of the present can be used, but also tubes for higher voltages that are in the process of development. The other, the intermediate model now announced, with which any present deep therapy technique can be followed, the transformer having a current rating ample for Coolidge tubes of higher current capacity than the present, at 200,000 volts.

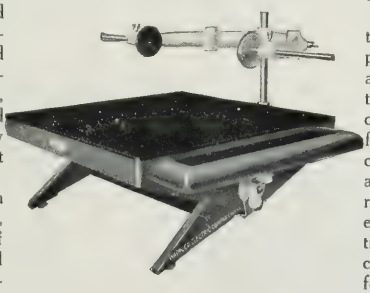
The larger machine is, needless to say, the logical selection where the intention is to use, as soon as possible, with the newer deep therapy technique, the higher voltage tubes of the future. On the other hand, the "Snook Special" combination deep therapy diagnostic machine meets the requirements of all deep therapy technique up to 200,000 volts and can be used also for radiography.

New Wappler Sinus and Mastoid Head Rest

THE CLINICAL importance and the technical difficulties of making correct examinations of the human head have for a long time justified the careful designing and working out of an adequate head rest. But because of the many different methods and techniques in use it has been a difficult task to develop a head rest which is applicable for all the various examinations of the head. However, for the examination of the frontal, the auxiliary and maxillary sinuses, definite methods of placing the patient's head upon the plate and adjusting the principal angle of the rays have been agreed upon, and similarly, for the examination of the mastoid cells and processes, definite positioning of the patient's head and directing of the rays have by agreement been found to give the best diagnostic roentgenograms.

A very useful head block has been designed by the Wappler Electric Co., based on these standard methods of examination, which is equally useful and adequate for the correct examination of the frontal and maxillary sinuses as well as of the mastoids.

In the illustration, this head block is shown with a head clamp, as it would be employed for immobilizing the head for the examination of the frontal sinuses. The desired angle of tilt can be adjusted with the clamping mechanism and scale, shown on the right side in the illustration, which indicates the angles of tilt. The head clamp is wide enough and the prongs are such that the head can be held in all desirable positions whether in the anterior or posterior, that is, for the examination of the frontal and maxillary sinuses or in the lateral position for the examination of the sella, turcica, the dome of the skull, foreign bodies in the eye, examination of the mandibles, the cervical part of the spine, etc. For this purpose the plate holder channel is placed in the head rest as close to the lower border as is feasible so that as many of the cervical vertebrae and as much of the neck can be included as the height of the shoulders will permit. For the examination of the lower jaw the head rest is tilted away from the patient, and a very convenient angle to eliminate super-position of the jaw above is obtained for the examination either of the lower or of the ascending ramus of the jaw in contact with the plate. For the examination of the mastoid processes, the head rest is tilted toward the patient to such an angle that the desired tilt of 15 degrees upward and of 10 degrees posteriorly, which gives the clearest outline of the mastoid cells and processes, is easily obtained.



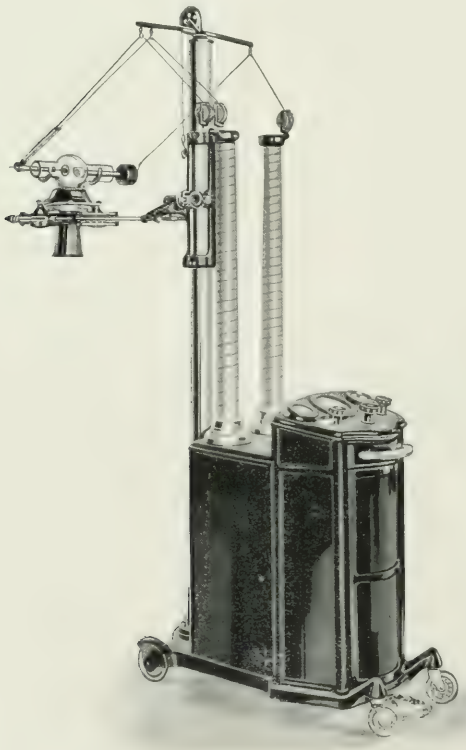
The head rest has a bakelite top and the plate or film is as close to the patient as possible to avoid blurring and distortion of the fine bony structure. For stereoscopic work the plate or film holders can be removed either from the side or upward and the plates can be placed either in a horizontal or a vertical position, as the case may require. The head rest may also be employed for the stereoscopic examination of extremities and it is found very convenient to be able to tilt the platform slightly to bring the plate or film in close contact with certain parts of the body. It appears that the combination of a mastoid and sinus head rest is a very successful solution to create a rather universally applicable head rest which undoubtedly will be welcomed and prove a very useful appliance in every roentgen ray laboratory.

Acme Bedside Roentgen Unit

THE ACME Bedside Unit, which was first exhibited at the May, 1922, meeting of the American Medical Association, is of all metal construction, with the exception of insulating materials. No wood is used at any point. The unit is complete in every detail with the meters, timer, filament equipment and all control handles, perfectly insulated, mounted directly on the control board. This makes it possible to do any work up to the full capacity of the 5-inch 30 ma. radiator type tube with one small and compact unit which may be moved to the point of greatest convenience.

The high tension transformer is of the closed core oil immersed type, with a separate filament transformer suspended in the same tank. This construction permits the filament control to be kept in the low tension circuit, a very pronounced advantage. A method of winding the high tension transformers, new in roentgen work, but proven in commercial work, has been used, so that magnetic leakage between primary and secondary is reduced to a minimum. In this way the high inverse current normally present when a self-rectifying tube is energized is cut down to a marked extent and the drop in secondary voltage with increase in load is also greatly reduced.

The control features of this apparatus are practically the same as those of the Acme 5-inch, 30 ma. unit and 85 kv. roentgen generator. Control of penetration is secured by means of a 20 point auto transformer. Measurement of penetration is obtained by means of a penetration meter calibrated from three to five inches. The filament current is controlled by an inductance regulator inserted in the low tension circuit and designed with a toggle action which gives practically uniform control of the current throughout its range. Measurement of the tube current is obtained by a milliammeter interposed in the secondary circuit of the transformer and carried at ground potential.



A timer mounted directly in the control stand can be provided for timing exposures. This piece of apparatus is equipped with electro-magnetic control. The exposure is set by means of a dial and is started by an electrical push-button at the end of a cable. If the button is kept depressed, the exposure will be automatically terminated at the end of the timer interval. It can, however, be stopped at any time necessary in case of an accident, etc. In this case the time will not go back to zero, but will remain set so that the balance of the exposure can be made if desired.

If the timer is not provided or is not used, the energization of the generator is usually controlled by means of a foot switch attached directly to the control stand. However, the push button and cable are also furnished, so that this method of control may be used when desired.

The foot switch, as well as the circuit controlling elements of the timer, are of the remote control type and do not themselves make and break the heavy currents required by the generator. A magnetic circuit-breaker in the control stand is controlled by these devices. This prevents in a great measure all the trouble from poor contact due to oxidized surfaces.

The safety of the operator, patient and apparatus is guarded to great extent by means of an overload circuit-breaker. This device is either operated by means of a button on the control panel or operates automatically if predetermined current is exceeded, as in case of sparkover.

The tube stand is of good mechanical design, giving all necessary adjustments and angles for bedside and portable work. It is equipped to hold a five-inch radiator type tube and is perfectly counterbalanced. Spring insulating terminals are attached to the upper end of the tube stand to keep the wires taut and clear of all conducting parts.

The high tension terminals are made throughout of insulating material capable of continuously withstanding the highest potentials used.

The cabinet housing the high tension transformer and its control parts is of all metal construction and is mounted on an iron base carried by large rubber tired wheels. This allows the entire unit to be moved from place to place with the greatest convenience.

The cabinet is finished in a two-tone black enamel. The tube stand is finished in black enamel, polished aluminum and nickel.

Victor "Truvision" Stereoscope

A STUDY of the principles of stereovision and its application in x-ray diagnosis, brings out the startling fact that while the effects which have been obtained were seemingly correct, the truth is that the manipulation of the illuminating factor, by which these brilliant effects were induced, served to defeat the very purpose of stereovision, so that instead of what was believed to be perfect stereovision it was illusion that actually prevailed.

The object of stereovision is to blend into one image two pictures of an object from slightly different points of view, so as to produce upon the eye the impression of relief—a true evaluation of depth. The value of this in x-ray diagnosis depends altogether on the degree of accuracy with which this effect is produced by the optical and mechanical facilities employed. If the stereoscope employed in the study of paired radiographs gives an impression of relief, from which to make deductions as to the relative depth of anatomic parts or foreign bodies, and which is not true to the conditions actually existing, then diagnosis can not be certain. With apparatus available up to the present, the roentgenologist has manipulated his source of illumination intending to bring out the maximum relief or stereoscopic effect, and in so doing has unwittingly obtained untrue evaluation of depth of the anatomic parts under study. He has drawn on his imagination, to an extent, to bring out an effect.

The Victor "Truvision" Stereoscope was designed with a view to applying the essential principles of stereovision in a manner that insures the roentgenologist against "spurious" relief. This has been achieved through careful study by Victor engineers of all the factors involved, and extensive experimental work, reverting to the conditions under which the radiographs are produced, to determine their exact relation to a method for producing correct stereovision.

A radical departure is made from stereoscopes of previous design, in that only one light bulb is used in each viewing box instead of the usual four. This single 150 watt bulb, nitrogen filled and with a concentrated tungsten filament, is placed centrally in the viewing box.

From the fact that the distribution of light from this bulb corresponds very closely to the distribution of x-rays under which the radiograph is produced, that is, with the intensity greater at the central portion of the film and where the anatomic part under study is usually placed, this reproduction of conditions obviously gives the natural effect or true stereovision.

Compare this with the unequal distribution of illumination characteristic of the four-bulb viewing box. With four sources of illumination there are four points of concentration, and, as the bulbs may vary in efficiency the effect would make diagnosis difficult, considering the composite nature of some radiographs.

Then again, the usual practice of placing a separate control for each viewing box has been abandoned in the design of the "Truvision" stereoscope. Instead a central rheostat control is used, with which the operator changes the intensity of illumination in the boxes simultaneously; each negative is therefore equally illuminated. A simple experiment will show that two sources of illumination unequal in intensity appear to the observer as though in different planes, which effect can be varied by increasing or decreasing the light intensity in either source. Logically, then, to avoid this in stereoscopy the illumination in the viewing boxes must be of equal intensity at all times. This is provided for in the "Truvision" stereoscope with the central rheostat control, each adjustment of which reacts simultaneously in both viewing boxes.

Protection of films against heat while mounted on the viewing box is assured, ample ventilation being provided through two vents, at top and bottom and immediately back of the diffused glass, running the width of the box. Consequently there is no accumulation of heat, and films or plates can be left on for any period of time, either wet or dry, without danger of sticking or affecting the emulsion. Incidentally, the ventilation serves also to prolong the life of the nitrogen bulb.

Fig. 2 shows how the entire optical bed can be raised or lowered, through a device in the vertical column, to accommodate the eye level of the observer, either standing or sitting. This feature is introduced for the first time in the "Truvision" stereoscope, and the advantage is at once apparent.

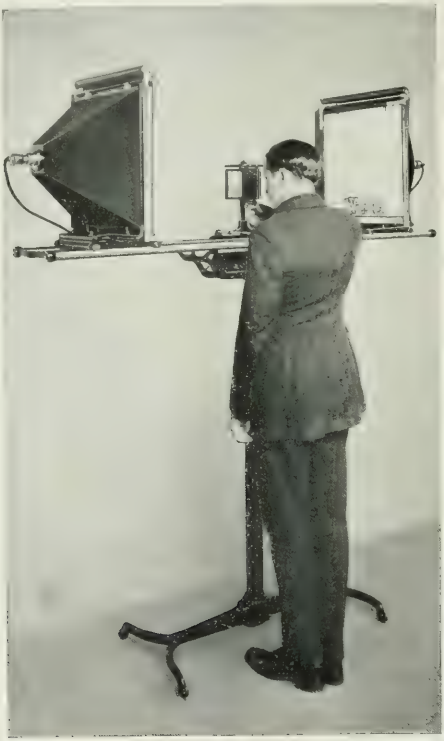
Note also in Fig. 3 that the optical bed can be mounted on the wall. This change from floor base to wall brackets can be made in a few moments. This provision can be taken advantage of in those instances where conservation of floor space is essential.

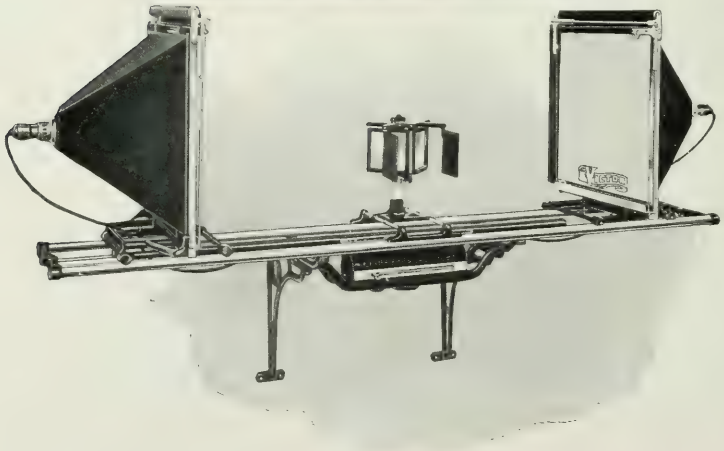
The all-metal construction (excepting the opaque water and heat proof curtains and the glass) makes the "Truvision" stereoscope durable in the broadest sense, and rigid, with nothing to warp. The drain-trough for wet negatives is of aluminum, so here, too, there is no possibility of rust or corrosion.

The mirrors can be adjusted to any angle required, simultaneously in either direction from the 45 degree angle, to right or left, or vertically for concentration on a certain area of the radiograph.

If desired the "Multiplex" attachment can be furnished, consisting of a second set of mirrors, so that two observers can view the same radiographs simultaneously. The second set of mirrors having adjustment features identical with the first, each observer thus independently accommodates his vision.

Another very interesting comparison of the "Truvision" stereoscope with the multiple lamp type is from the standpoint of economy. Considering that only two light bulbs are used on the former as against the usual eight in the latter, and figuring on the basis of average use of one hour per day for 300 days each year, the two 150 watt bulbs will consume 90 kilowatt hours of current; at the rate of 10 cents per kw. hour makes an annual cost of $9.00. With the usual 8-bulb stereoscope consuming 800 watts per hour or 240 kw. hours, the cost annually will reach $24.00. This means a saving of $15.00 on current alone; the difference in cost for lamp renewals will increase this figure.





Kromayer Bedside Unit

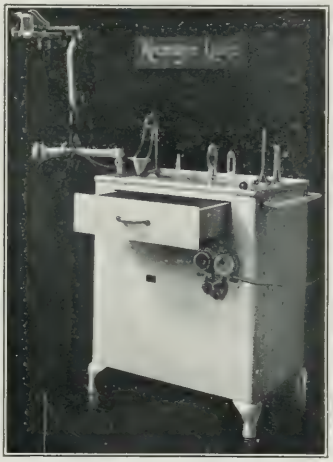
FOLLOWERS of the principle of water-cooled quartz lamps, will find many advantages in the new Kromayer Lamp Bedside Unit, manufactured by the Hanovia Chemical Company.

This unit is called semi-automatic by its manufacturers. In response to a wide-spread demand for a Kromayer lamp sufficiently portable for use in hospital wards and also to avoid the necessity of special water connections where the lamp is used in several rooms in private practice, the Hanovia Company has perfected a semi-automatic outfit known as the bedside unit, illustrated herein.

The quartz burner is mounted on an adjustable arm, which possesses sufficient rigidity to hold the lamp firm when in use and still give almost universal adjustment motion.

The outfit is equipped with all necessary electrical regulation, built into a handsome white enameled table, large water tank for cooling the burner and circulating pump, which is operated by the lamp switch. By this arrangement, it is possible to light the lamp before the water has been turned on. The water flow is visible and cannot escape attention. The tank contains an ample water supply to avoid heating even in continuous operation, and is provided with a small stopcock for draining off the water when desired.

The tank is also equipped with a visible float, which serves as a water gauge, and shows at a glance whether the tank is properly filled. The tank is made of solid copper and will not rust.



In the side of the table is a commodious drawer divided into compartments for the various shaped applicators, which are, therefore, kept always handy and the table top is furnished with a ribbed rubber mat, removable for sterilization, to receive the instruments, etc., in use.

Agfa

AN ANNOUNCEMENT of interest to many American radiologists is that of the Sagamore Chemical Co., Inc., of New York, that it is now able to supply the well known AGFA plates. That Company also has the x-ray films coated on both sides.

The AGFA plate was used quite generally in the United States prior to the war, and it has only been lately possible for the Sagamore Company, sole American agent, to obtain shipments in sufficient quantity to supply the market.

Commercial Exhibit, Annual Meeting

From the interest already manifested, it is safe to assume that the commercial exhibit at the annual meeting of the Radiological Society of North America, to be held in Detroit, December 4th to 8th inclusive, at Hotel Statler, will surpass anything of its kind in the history of the organization.

With all the available space sold and manufacturers and distributors of various appliances and apparatus clamoring that they be given room to show their wares, there is no question but that the capacity of the hotel will be taxed to the limit.

In this connection, it is probably only fair to say that the attendance bids fair to outnumber anything previously of record in the science of radiology. A very comprehensive and instructive scientific program is being arranged, a scientific exhibit to which there has been nothing comparable in the history of the Radiological Society is assured, reduced railroad rates under the identification certificate plan will be in effect, and with the wide recognition that is being accorded radiant energy in its various forms both as a diagnostic aid and therapeutic agent, the meeting is sure to bring together an unusual number of men from all parts of the United States and Canada who are seriously interested in science.

The effort of the exhibitors will be to make their exhibits both interesting and educational. Each exhibit will be in the hands of competent men from whom information can be obtained without any embarrassment.

Exhibitors

Space No. 1—Patterson Screen Co., Towanda, Penn.

Space Nos. 2 and 3—Standard X-ray Co., 1932 N. Burling St., Chicago, Ill.

Space No. 4—Jno. V. Doehren Co., 208 N. Wabash Ave., Chicago, Ill.

Jno. V. Doehren Company will show a general line of roentgen accessories of the highest character. In particular the celebrated Gehler Folie Intensifying Screens, for which we are the general agency for the North American continent.

Space No. 5—Radium Chemical Co., Marshall Field Annex, Chicago, Ill.

The Radium Chemical Company of Pittsburgh will have on exhibit the latest apparatus used in connection with radium work, and will demonstrate several new methods for handling radium. The present tendency is toward simplicity, and with that end in view, new instruments have been designed to simplify the handling and application of radium.

Following out the custom of having a radium conference in Pittsburgh either before or after all national meetings, we desire to announce that for this meeting the conference will be held from December 11th to 15th, and all members of the Radiological Society are cordially invited to be present.

Space Nos. 6 and 7—James Picker, Inc., 497 Lexington Ave., New York City, N. Y.

Space No. 8—Sagamore Chemical Co., Inc., 213-15 Water St., New York, N. Y.

Sagamore Chemical Co., Inc., New York, American distributors for "AGFA" x-ray films and plates, will have an elaborate exhibit, which is now being prepared abroad.

Space Nos 9, 10 and 11—Engeln Electric Co., 4601-11 Euclid Ave., Cleveland, Ohio.

Space Nos. 12 and 13—Victor X-ray Corp., 236 S. Robey St., Chicago, Ill.

Chief among the apparatus which will be on display will be the new Victor Stabilized Mobile X-ray Unit, a recent Victor achievement, which is radically different from any type of x-ray apparatus heretofore offered to the profession. The three most outstanding features of this new unit are the Stabilizer, Auto-Transformer Control and Circuit Breaker. The merits of the Stabilizer are already apparent to the majority of x-ray users throughout the country. Not only does this device eliminate the disadvantages due to line fluctuations, but it furthermore means a considerable saving in tube and film costs, not to mention the freedom from worry, and the certainty of results which will accrue to the user. The Auto Transformer control furnished with this new unit provides for twenty-six separate control steps, thus giving to the user a refinement of control that is truly ideal. The Circuit Breaker provided with this unit means not only protection to the tube, but also protection to the operator and patient.

Another Victor development which will be on exhibit is an improved type of stereoscope. This new outfit is the result of considerable experimental work by Victor engineers and combines features which make for a stereoscope of the utmost economy, simplicity of operation, beauty of design, and above all, even diffusion of light over the radiographs to be viewed, resulting naturally in more certainty in diagnosis.

The Victor line of Quartz Lamp Equipment will also be on display at the meeting. Both the Water Cooled and Air Cooled Lamps will undoubtedly attract the usual close attention on the part of the medical profession, but in addition there will be on display the new mobile hospital unit, which is designed so as to be conveniently wheeled from room to room.

Those in attendance at the meeting will also wish to carefully inspect the latest type of Victor High Frequency apparatus, a machine of portable construction delivering sufficient current for the treatment of any condition indicating the use of high frequency currents.

Space No. 14—Buck X-ograph Co., 6629 Olive St., Rd., St. Louis, Mo.

This exhibit will consist of a display of X-Ograph Dental Film Packets, X-Ograph Developing and Fixing Chemicals, the X-Ograph Contact Cassette, and X-Ograph Universal Dental Film Mounts, including a dental film mount filing device and film viewer, incorporating a decided departure from the old method of mounting and viewing dental radiographs.

Space No. 15—George W. Brady & Co., 809-11 S. Western Ave., Chicago, Ill.

Space Nos. 16 and 17—Liebel Flarsheim Co., 410-16 Home St., Cincinnati, Ohio.

Space No. 18—Sweetbriar Laboratories, Inc., 1220-28 Hodgkiss St., N. S., Pittsburgh, Penn.

This exhibit promises something of unusual interest in the way of work done with the new Sweetbriar screens.

Space Nos. 19 and 20—Waite & Bartlett Mfg. Co., 53 Jackson Ave. Long Island City, N. Y.

Oil Immersed Unit—This comes in a tank 23½ inches long, 12 inches wide, 13 inches high. Mounted in the tank is the high tension transformer and a separate filament current transformer. Above this is placed the lead glass shield and 30 milliampere radiator tube. The unit is shipped having the oil in a separate container. The tube goes in the regular crate. The tube holder, however, is arranged so that it is a very simple matter to put the tube in the lead glass shield and mount it in the tube holder, which is permanently attached to the under part of the cover.

There can be an opening in the top of the box for the x-rays to come through, or it can be placed on the side. It can also be arranged so as to take the same shutter that is used with our fluoroscope.

This unit can be mounted on a carriage under a fluoroscopic table, or it can be mounted between two uprights having a counter-balance adjustable for height.

New Model Radiographic and Fluoroscopic Transformer with Oil Immersed Automatic Throw High Tension Switch—This transformer is in a tank 16 inches long, 12 inches wide, 14 inches high. In this tank is mounted a high tension transformer, filament current transformer and double throw automatic high tension switch. There is a double set of high tension terminals coming out of the top. When this is connected with the control cabinet or control panel, the high tension switch is automatically thrown one way or the other, according to whichever foot switch the operator steps on. This does away with having to stop to turn the high tension switch or to even give it any thought. A still greater advantage is that it does away with the oxidation which takes place in the filament circuit of the ordinary exposed high tension switch, causing trouble.

New Model Control Cabinet for Thirty Milliampere Transformer—The same equipment, instead of being in cabinet form, the cabinet mounted on a slate base so that it can be readily placed against the wall.

This control cabinet can be used either with the fluoroscopic transformer or with the oil immersed unit. The switchboard or cabinet, contains the following:

Coolidge meter, voltmeter and milliammeter.

Auto-transformer adjustable in two-volt steps.

Adjustable overload circuit breaker with double silver contacts opening both sides of the line.

Automatic current regulator which will keep the milliamperes constant at five or thirty. This is controlled by means of a two-way switch which is marked "Fluoroscopic and X-ray."

Two connections for floor switches to be used either singly or in combination with the fluoroscopic transformer, having an automatic high tension oil switch.

A plug connection for floor foot switch. This is arranged so that it is impossible to use 30 milliamperes except when the switch is on the side which enables you to use the foot time switch. In other words, you cannot possibly turn on 30 milliamperes with the ordinary foot switch.

There is another outlet which can be connected with a red light overhead so that when the foot switch is used the red light automatically goes out.

New Model G-U Massachusetts Fluoroscopic and Bucky Diaphragm Table—This consists of a table having the Bucky Diaphragm permanently attached to it and movable. At one end underneath is placed an oil immersed fluoroscopic unit which is adjustable six inches each way. Attached to the base of the Bucky is an upright which supports the oil immersed unit, arranged so that the rays come out of the bottom of the tank. This is accurately centered over the center of the Bucky so that after the operator has made a fluoroscopic examination, he can, without moving the patient, simply push the Bucky down to the other end of the table under the patient; the Bucky having been previously loaded wiht the film. The control board can be mounted at one end of the table if desired, so as to eliminate all wiring possible.

New and Original Model Stereoscope—This is mounted on a counterbalanced stand so that the operator can sit down in a comfortable chair in front of it and make his examination without any discomfort.

The illuminating boxes are novel in construction, the curtains being placed inside of them but being adjustable from the outside. This enables the placing of a cross-bar so that the films can be readily held in position without any difficulty.

This apparatus stereoscopes very much easier than the ordinary type owing to the fact that the operator looks directly at one plate with one eye; while the other eye looks at the mirrored surface. It is hard to believe what a very great difference in clearness this arrangement results in.

United States Army Mobile Unit—This is the model such as was made up for the U. S. Army in conjunction with the late Professor John S. Shearer of Cornell University, and represents the result of his experience in France. It has been designed with a view to economy of space without losing the advantages of universal adjustments.

This is in a cabinet 20 inches wide, 24 inches deep, 36 inches high. There is a 35 foot service reel permanently attached in the cabinet to be connected with the electric light service. There is space so that a rotary converter can be used to operate up to ten milliamperes, and mounted in this unit. The sides are all removable, so that every part is accessible.

This is a unit which every hospital should have. It will do all kinds of radiographic and fluoroscopic work. It is, of course, not suited for therapy or for instantaneous work; but it will answer the requirements of any small hospital.

Latest Improvement on 10 K. W. Interrupterless Machine for Alternating Current—This 10 K. W. Interrupterless Machine has been improved in the following ways:

All makes of alternating current interrupterless machines have polarity indicators; so that when the apparatus is put into operation the operator is supposed to look at the polarity indicator and then turn the pole changer switch one way or the other. If, however, he fails to do this and closes the operating switch, the polarity may be wrong and the possibilities of puncturing a tube are very great.

With this new arrangement, this is all absolutely avoided. It is simply impossible to turn on any high tension unless the polarity is correct. When the machine is started up there is a red light. If this lamp lights up the polarity is wrong. If, however, the operator neglects to pay any attention to it and goes ahead and closes the operating switch, nothing will happen, he simply cannot get any high tension. He will then, of course, look to see what is the matter and notice the red light, which means that the pole changer should be turned in the opposite direction. This device is exceedingly simple and there is nothing whatever to get out of order.

This unit also carries an auxiliary contact. This is for use in making automatic stereoscopic exposures in combination with the new electric-trip stereoscopic tubestand and electric-trip vertical plate changer. In order to do stereoscopic work with the new equipment, it is simply necessary to load the plate changer, place the patient in position, and

have the tube in position for the first exposure. The operator then simply closes the operating switch. This will make the first exposure, and the instant it is over the tube will shift and the plate changer will revolve. During this period the time switch will reset itself; and the instant the second plate comes into position the second exposure will be made and cut off.

Space No. 21—French Screen Co., 406 McKerchey Bldg.. Detroit, Mich.

Space Nos. 22, 23 and 24—Kelley-Koett Mfg. Co., Inc., Covington, Ky.

Space Nos. 25 and 26—Radium Co. of Colo., Radium Bldg., Denver, Colo.

The Radium Company of Colorado will exhibit a complete line of radium applicators and accessories. In addition to the usual instruments which have been regularly furnished with radium, the equipment shown will include numerous accessories of new designs.

The gold needle with platinum-irridium tip has been discontinued and needles of platinum-irridium or non-corrosive steel, are recommended. Possibly the most interesting development in needle design will be the new short length non-corrosive steel needles containing five milligrams each. These needle applicators, which are exactly one-half the length of the ten milligram needles and identical in external diameter, will be shown with accessories to facilitate application. The advantage in using the short needles of this design in conjunction with the standard long ten milligram needles will be demonstrated, with reference to the adaptability of standard screens.

A slender needle designed to contain three or five milligrams of radium element will also be included. Platinum-iridium needles of sufficient wall thickness to absorb all beta radiation will illustrate the prevailing tendency in French design of such radium applicators. Brass capsule screens to contain needles have recently been added to the equipment not shown in the company's catalog.

Among new accessories for needles is a new type of needle introducer which has practically eliminated every difficulty in threading. The instrument is designed for imbedding non-corrosive steel needles. It will be shown in six, eight, ten and twelve inch lengths.

Another needle accessory is the flexible needle-holder, designed for use in conjunction with some standard form of operating cystoscope. This special needle introducer is supplied to meet a demand for a simple attachment for any standard instrument to avoid the necessity of duplicating the expensive lens system and other parts of the entire cystoscope. As an operating cystoscope is invariably found in the urologist's armamentarium, the new accessory will probably meet with general approval.

The result of considerable study and co-ordination of ideas obtained from numerous radium therapists will be seen in a new form of esophageal applicator. The chief advantage claimed is the simplicity of design. The instrument will be shown in various sizes to contain either glass radium-containing tubes or metal needles.

A new form of metal lined carrying case for radium needles will be shown. This case has been designed to accommodate the wires attached to needles, thereby providing a satisfactory container to hold the needles when ready for application. The number of needle compartments is made to meet individual requirements.

Metal-covered plaques in the design of which a marked departure from existing practice has been made, will be shown with records to illustrate the advantage of the new instrument over the older form of composition-covered plaques. The radium in the new flat applicator is distributed directly beneath a very thin layer of Monel metal, which permits the passage of approximately three times as much beta radiation as escaped through the much thicker layer of composition. These plaques are shipped in new lead-lined carrying cases which will also be included in the equipment shown at the Radium Company of Colorado booths.

Adaptable applicators have been designed to facilitate the application of glass tubes or metal needles in the treatment of skin conditions. Several types of these instruments will be shown, including applicators to hold two glass tubes in separate compartments, and instruments to contain five or more needles. In each instrument the primary applicator is held in position beneath a very thin layer of non-corrosive steel.

Several forms of very practical distance applicators will be shown, including a special form of eye cup to hold radium tubes or needles at a distance of approximately twenty-five millimeters. The distance applicators and eye cup are supplied with special sheet-metal screens of various thicknesses. A convenient screen of gold-plated brass, moulded to fit the contour of the eye may also be mentioned.

Among the general accessories will be included, Balsa wood for blocking radium away from the skin. It is an extremely light weight wood, highly recommended on account of the ease with which it may be cut to the required shape and also because it absorbs very little gamma radiation. A special grade of Kerr's Dental Compound, Bronze Ligature Wire for radium needles, sheet-lead in various thicknesses and special forms of pure rubber tubing will also be exhibited.

The above mentioned articles are some of the new accessories which, together with the other instruments that the company has regularly furnished its clients, will be demonstrated by representatives, who will be in attendance at booths twenty-five and twenty-six during the entire session

Space Nos. 27, 28 and 29—Acme X-ray Co., 341-51 W. Chicago Ave., Chicago, Ill.

Space Nos. 30, 31, 32 and 33—Wappler Electric Co., 162-84 Harris Ave., Long Island City, N. Y.

WAPPLER COMPOSITE X-RAY UNIT—Among the new developments that the Wappler Electric Co. will have on display will be the Wappler Composite X-ray Unit. This apparatus has been on the market for about six months and in that time has been proved a phenomenal success. It is truly composite, being made up of all standard Wappler parts, "Integral Units." The initial Integral Unit or part can be obtained at once at a small expenditure and by means of further moderate investments, at any time, a purchaser can complete his Composite Unit.

A careful inspection of this apparatus is suggested.

WAPPLER DUPLEX MODEL ROENTGEN RAY MACHINE—A second interesting development will be the Wappler Duplex Model Roentgen Ray Machine. This apparatus is truly Duplex. It has a capacity of *Radiography* of from 1 to 70 milliamperes at a 6-inch back-up and a *Therapy* capacity of 1 to 8 milliamperes at a 15-inch back-up. It is most reasonably priced, attractively finished, and fully efficient in every way.

WAPPLER VERTICAL FLUOROSCOPE—Incorporated also in this exhibit will be the new Wappler Vertical Fluoroscope, affording a radical departure in the method of mounting the tube. The Trochoscope or Tube Box of this Fluoroscope is of an entirely new design, entirely made of metal and affords a maximum protection. An additional feature incorporated in this new type Floroscope is an adjustable seat, by means of which children can be comfortably

examined with the operator in a standing position, or patients in a weakened condition can be seated for examination.

COMPLETE WAPPLER DEEP X-RAY THERAPY EQUIPMENT—As an accessory exhibit to the main Wappler exhibit in the Statler Hotel, a complete Wappler Deep Therapy installation, including a Wappler Deep Therapy Transformer and Rectifier, Wappler Safety Tube Holder and Table, Sphere Gaps, etc., etc., will be installed and running in the Shurly Hospital, a short distance away from the hotel. Actual clinics will be held using this installation during every day of the meeting and interested visitors will be welcomed.

Commercial Exhibit Room B

Space No. 13—Horlick's Malted Milk Co., Racine, Wis.

Space No. 14—National X-ray Screen Company, 24 North Wabash Avenue, Chicago, Ill.

Space No. 15—Roentgen Appliance Company, 667 Howard St., San Francisco, Calif.

Space No. 16—T-E X-ray Laboratory, So. Bethlehem, Pennsylvania.

This exhibit will consist of T-E Screens, Cassettes and Units shown in such a manner as to clearly point out the many advantages and fine points of these products.

Space Nos. 17 and 18—High Tension Transformer & Equipment Corporation, 200 Washington St., Hoboken, N. J.

The "Intermediate" X-ray Unit has achieved unusual success in embodying a machine of large capacity in exceptionally small space. Intense interest has been shown in this unit on account of its distinctive type of rectifying mechanism —the Rotary Wave Selector—which has made it possible to build in a mobile form a machine for x-ray therapy up to 5 ma. at a 9-inch gap and for radiography up to 40 ma. at a 6-inch gap.

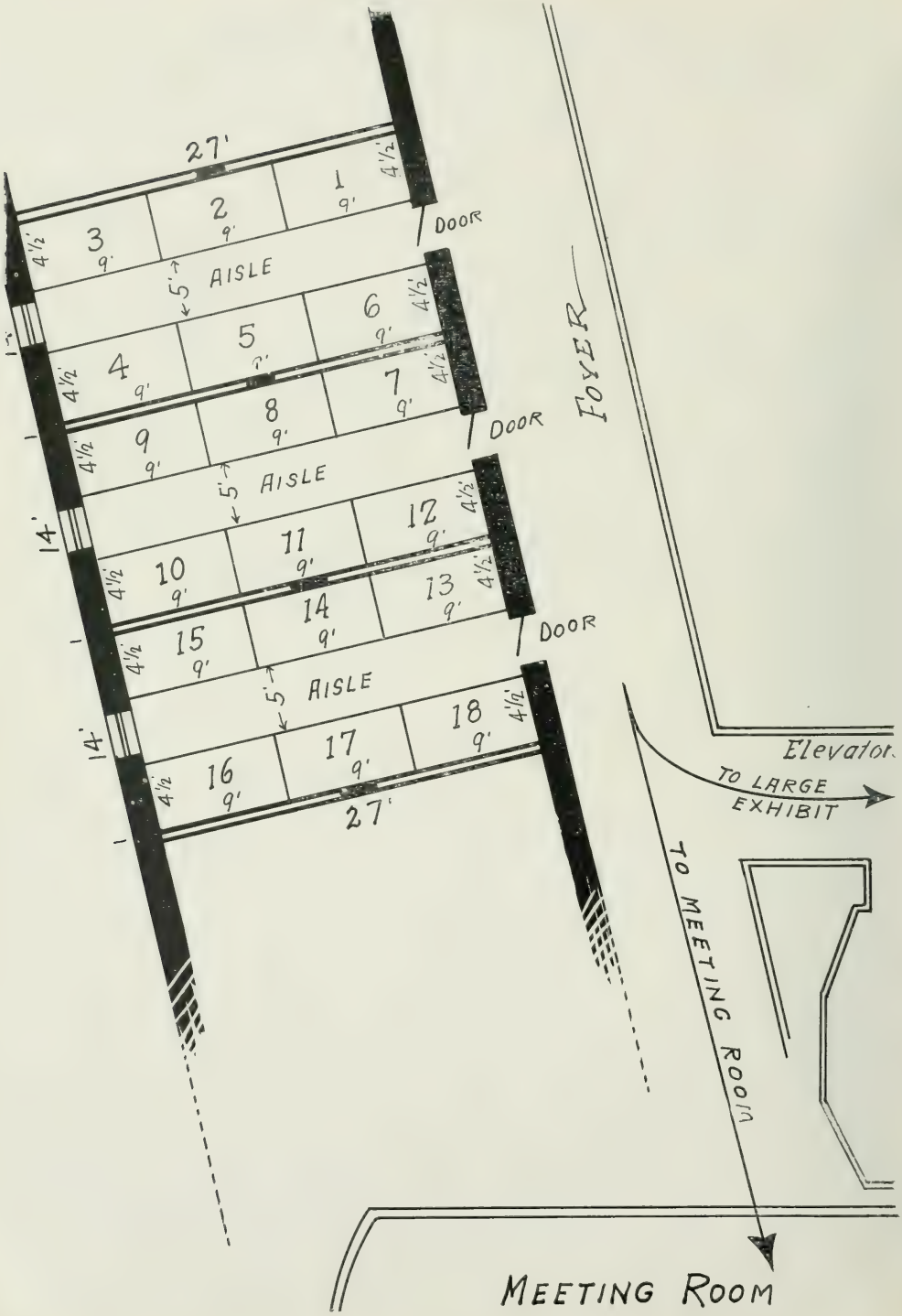
The "Special" Combination X-ray and High Frequency Machine will also be demonstrated. This machine is equipped to operate the radiator type tube up to 30 ma. at a 5-inch gap and also to give both Oudin and D'Arsonval currents when treatment with these is indicated.

The efficient Multiple Spark Gap is an exclusive feature of "High Tension" high frequency machines and has become recognized as the most ideal high frequency gap yet developed.

The "Special" machine is also equipped with hot cautery, rapid sinusoidal and taps for operating electrically lighted diagnostic instruments.

The "Standard Jr." High Frequency Machine is designed to generate exclusively Oudin and D'Arsonval currents of delicate regulation and a wide range of intensities from the mildest effleuve to those of deep thermic effect as used in electro-coagulation of dense growths. This is the apparatus which has been widely named "The *real* high frequency machine."

Every physician is cordially invited to visit booths 17 and 18 and inspect these machines.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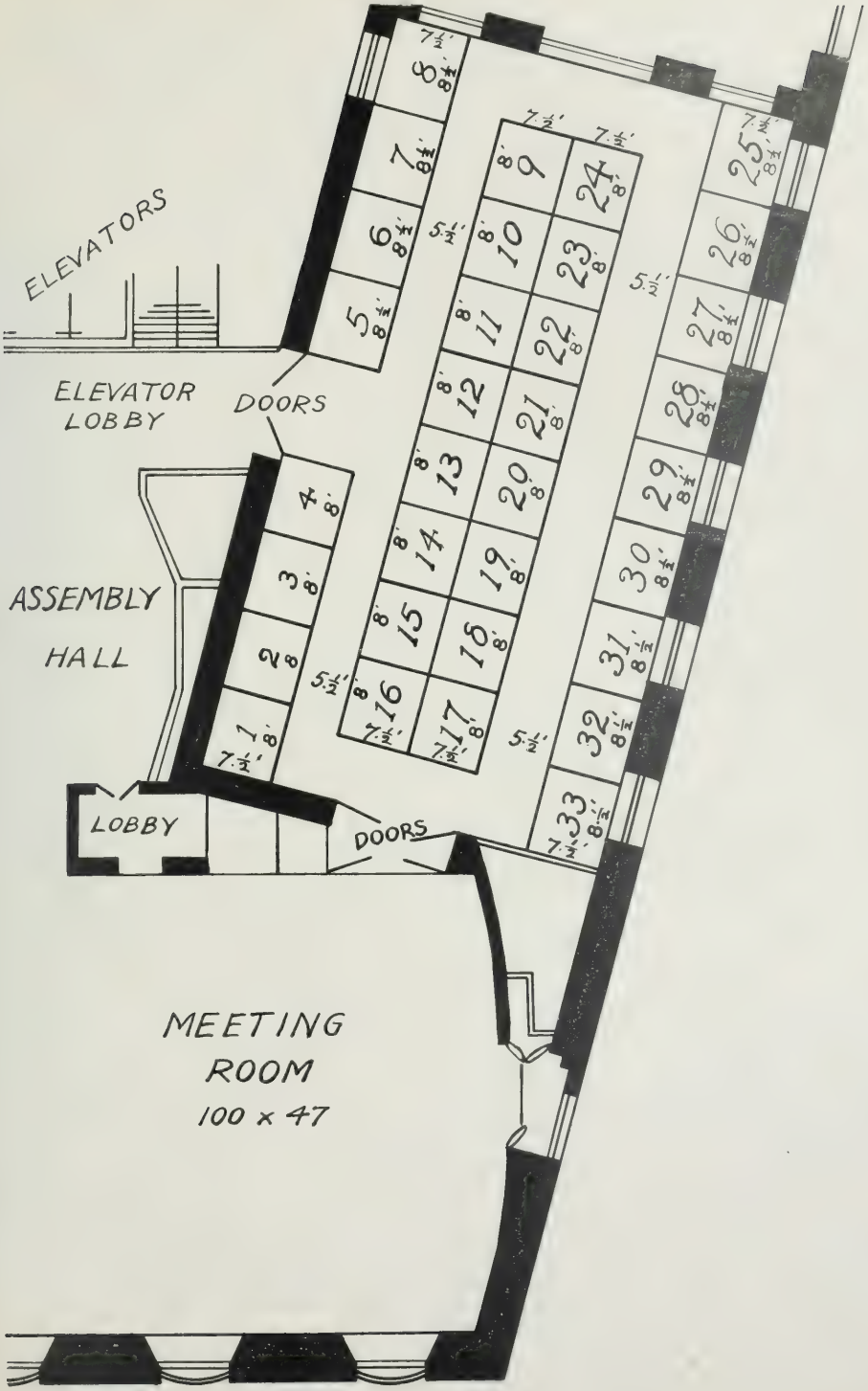
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ABSTRACTS and REVIEWS

Modern Views of Cancer. Harry C. Saltzstein, M. D., J. Michigan M. Soc., 21:429, October, 1922.

IT IS TRUE that some tumors develop from misplaced embryonal cells, but the vast majority develop apparently irrespective of misplacements and their presence does not always indicate that neoplastic growth will follow, neither does their growth always result in tumor.

Ribbert's doctrine of cell autonomy holds that cells removed from active growth restraints will at once start on a riotous, autonomous new growth. Mechanical pressure, specificity of function, nutrition and organization are some of the forces of tissue tension the disturbance of which may result in such unrestrained growth.

Breaking down of encapsulation, with resultant release of mechanical pressure, often is followed by malignancy. Specialized function, such as secretion of the gastric juice, of milk or of mucus, inhibits growth capacity, but when in the breast or uterus, for example, the specialized function ceases it often becomes a case of "Satan finds some mischief still" for idle cells to do, and neoplastic growth results.

Of nutrition the author says: "Tumor cells have an abnormal capacity to absorb nutriment. In certain instances a hormone has been supposed, or that they exerted some influence on neighboring cells. Why they can assimilate so voraciously is, however, a very obscure problem."

As to organization he says: "Cancer has lost the control of the organism." Regeneration of a limb in a crustacean is an illustration of growth under control of an organism. Frequently cell groups become displaced through some pathological process. Many cancers follow chronic inflammatory irritation, which leads to the theory that successive generations of cells subjected to ceaseless trauma finally may lose the body growth restraint.

The parasite theory of tumor growth "is as old as the history of medicine itself." Much experimental work has been done along the line of this theory, but there are many complex factors involved which make the value of the statistics secured by this study very difficult to interpret. Bacilli, cocci, spirellae, mycelia, blastomyces, yeasts, ameba—all have been cultivated from cancers and tumors have in some instances been reproduced, but the most of them have been granulomas. Infection, the author remarks, produces degeneration and wasting, but the transplanted cells of cancer grow where they lodge and the parasite, if such there is in this disease, would have to live in symbiosis with the cell. It is true that Nuzum seems to have fulfilled this condition in his experiments with the Crocker mouse carcinoma, but the parasite isolated by him in this study grows only very slowly unless aided by tumor trauma.

The answer to the enigma may be wrapped up in the mysteries of biochemistry, but for the present our sole practical knowledge is that cancer begins locally and only when it is removed early is it curable.

Cancer and Parasite. Isidor Kross, *Columbia University, Institute of Cancer Research;* J. Cancer Research, 6:257, October, 1921.

NUZUM recently tried to demonstrate a bacterial cause for mouse carcinoma No. 11 of the Crocker Institute and believed that he had done so. He isolated a diplococcus from this particular carcinoma and inoculated a culture of it into mice who then developed this same type of tumor.

The author has carried on further experiments with this carcinoma No. 11 and believes that he has disproved the validity of Nuzum's conclusions.

The tumor cell and the micro-organism are the two factors upon which the author based his experimentation. To prevent the tumor cells from participation in the production of growths induced by inoculations of tumor No. 11 he administered sufficient x-ray dosage to several mice to kill the tumor cells. Twenty-four mice were then inoculated with the aseptically excised tumor and cultures were also made, according to Nuzum's technique, from the excised tumor and inoculated into 60 mice.

The second method of destroying the tumor cells before inoculation was alternate freezing and thawing. Controls were used throughout all experiments.

The author's conclusions are as follows:

"1. While most of the ascitic tissue fluid cultures of Crocker Institute carcinoma No. 11 contained micro-organisms of various kinds, in no instance was there found the characteristic micro-organism described by Nuzum.

"2. In not a single instance was the inoculation of the mice with these cultures followed by tumor growth.

"3. It is probable that the two undoubted tumors in Nuzum's series were a spontaneous new growth."

The Influence of Hydrogen Ions and of Various Salts in Different Concentrations Upon the Growth of Transplanted Flexner-Jobling Rat Carcinoma. Kanematsu Sugiura, Helen Miller Noyes and K. George Faulk, *From the Huntington Fund for Cancer Research, Memorial Hospital, and the Harriman Research Laboratory, The Roosevelt Hospital;* J. Cancer Research, 6:285, October, 1921.

ALBINO RATS were inoculated with the Flexner-Jobling rat carcinoma after the grafts had been immersed in solutions of various salts of different hydrogen ion concentration. The tumors were allowed to grow for from six to seven weeks. It was found that calcium strongly inhibited growth and a pH of 6.0 was found to be more harmful than one of 8.0.

The growth of tumors was compared with the protease action of extracts of malignant human and rat tumors. The optimum hydrogen ion concentration for protease action and the favorable medium in which tumor fragments on immersion retain their ability to grow when transplanted corresponds very closely to that represented by a pH of 7.0, unfavorable conditions for both being reached more rapidly on the acid side than on the alkaline side.

The authors conclude that the connection between the conditions affecting the permeability of cell membranes, the factors which influence the activities of intracellular enzymes, and the relations of the inorganic constituents of neoplastic or other tissue, is still obscure and requires much more experimental study to make it clear.

Primary Spontaneous Tumors in the Kidney and Ardrenal of Mice: Studies on the Incidence and Inheritability of Spontaneous Tumors in Mice, 17th Communication. Maud Slye, Harriet F. Holmes *and* H. Gideon Wells. *Otho S. A. Sprague Memorial Institute and the Dept. of Pathology, University of Chicago;* J. Cancer Research, 6:305, October, 1921.

THIS PAPER covers 30 pages, to which there is appended the

authors' summary and a bibliography of 52 references. The following is from the authors' summary:

"In a series of 33,000 autopsies on mice of the Slye stock, dying natural deaths at all ages * * there have been observed * * * cases of true primary neoplasm arising from renal or adrenal tissues." These numbered 25 and are classified as follows:

Kidney—1 carcinoma, 3 adenomas, 1 hypernephroma, 8 sarcomas, 3 mesotheliomas.

Adrenal—1 cortical adenoma from a misplaced inter-renal adrenal rest, 3 mesothelial tumors.

Five others of mesothelial structure characteristic of urogenital anlage neoplasms, but their exact origin could not be determined.

Five thousand other tumors were presented in these 33,000 mice, so these 25 are taken to be uncommon tumors in mice, at least in mice of this particular stock.

There was found no instance of a mixed renal tumor of the Wilms type and there was not a single case of typical malignant hypernephroma. Although inflammatory conditions are very prevalent in mouse kidneys epithelial tumors are rarely found; none of these were found in the renal pelvis though one of the sarcomas seemed to take its origin in the pelvis.

Several instances of malignant retroperitoneal tumors have been observed, but only two were included in this series.

"Secondary tumors have never been found in the adrenals, and but rarely in the kidneys. Although this series includes at least 3,000 cases of mammary carcinoma, often with widespread metastases into the lungs, we have never seen a secondary carcinomatous growth in the kidney. The only secondary carcinomas of the kidney as yet observed are four cases in which the primary carcinoma was in the lung, thus establishing the true neoplastic nature of these lung growths. In but two cases have metastatic sarcomas been seen in the kidney, if we exclude the numerous cases of invasion of the kidney by direct extension from para-renal growths."

Little difference in the incidence in the sexes was noted. Except for one case there was no incidence of malignancy in mice under four months old and but few under six months old. Most of the renal sarcomas occurred between the ages of seven months and one year, somewhat earlier than the usual time of appearance of epithelial growths and corresponding to experience with human neoplasms.

"The epithelial renal and adrenal tumors furnished no illustration of metastasis, but in three cases of sarcomatous or mesotheliomatous growths there was noted involvement of the adjacent lymph nodes; in two there were pulmonary, in two hepatic, and in one splenic metastasis, and in one case there were numerous peritoneal growths. The mesothelial type of growths produced the most extensive metastasis and the most widespread infiltration of the body wall."

A review of the literature disclosed only six other cases of renal tumors in mice, all epithelial, and showed no adrenal tumors.

A Critical Investigation of the Freund-Kaminer Reaction. Louis Herly, *Columbia University, Institute of Cancer Research;* J. Cancer Research, 6:337. October, 1921.

FREUD and Kaminer in 1910 reported certain phenomena which occurred when tumor cells were mixed with blood serum from non-cancerous individuals on the one hand or with blood serum from cancerous patients on the other hand. The relationship thus discovered is known as the Freund-Kaminer reaction.

Their studies showed that the serum from non-cancerous subjects destroyed most of the cancer cells. Non-cancerous serum did not destroy normal cells whether these were from normal persons or from those having cancer. They argued from these studies that resistance of carcinoma cells to carcinoma serum pointed to some lytic property in normal serum rather than to any vulnerability of the carcinoma cell. Recently they have published further experiments to show that the normal serum and tissues contain an organic fatty acid able to destroy cancer cells. They call this "normal acid." They believe that cancer and the serum of cancer patients contains an acid that protects the cancer cell by destroying the normal acid.

The authors of this paper believe that in the studies of Freund and Kaminer it is open to question what proportion of the cancer cells used were alive and whether the serum used might not have been more or less decomposed since sometimes the serum was obtained fresh and sometimes postmortem.

They summarize the conclusions from their own study thus: "The conclusions to be drawn from the whole series of experiments are equally clear. After having made sure that there was no difference in the action of either rabbit or guinea pig serum on the one hand, and rat serum on the other; and after having eliminated the sources of error enumerated by Freund and Kaminer, namely, the admixture of connective tissue capsule and its blood vessels the presence of red blood cells in the serum, the use of old serum or of serum obtained at the height of digestion; and having, furthermore, used carcinoma (the most sensitive tumor to this test, according to the originators) instead of sarcoma, as had been done by previous investigators, we are still unable to detect any marked difference in the results of inoculation, whether tumor serum or normal serum is used. The growth capacity seems neither increased in the one nor diminished in the other. We feel justified in stating, therefore, that the Freund-Kaminer reaction remains at present unproved. With this proviso, however, that these experiments prove only that the serum of normal rats is devoid of any deleterious effect on the Flexner—Jobling rat carcinoma. What might be the case with serum from a rat bearing a spontaneous carcinoma we do not know. However, the first half of the experiment seems sufficient; for since this shows clearly that normal serum has no harmful effect upon the cancer cell, there can be no difference with respect to cytolytic power between normal serum and that of an animal with a tumor, be this transplanted or spontaneous."

The Relation of Muscular Activity to Carcinoma: A Preliminary Report. Ivar Sivertsen, M. D., *and* A. W. Dahlstrom, M. D., J. Cancer Research, 6:365. October, 1921.

THE FREQUENCY of carcinoma observed in retired farmers and the improvement of precancerous patients on a prescription of increased daily exercise led the authors of this paper to consider what relation muscular activity might have to carcinoma.

According to Hoffman's statistics carcinoma is more prevalent among the unoccupied and the leisured and professional classes than in the opposite classes, and also it occurs more frequently in over-nourished or well fed and well housed individuals than in the poor. It is also more prevalent in warmer climates. Reading between the lines of these statistics the authors find support for their theory that muscular activity in some way protects against cancer.

Among domesticated animals, and fish artificially bred, carcinoma is more frequent than in wild life, although it is admitted that there probably has not been the same study made of wild life owing to lack of opportunity.

"The present day labor saving machinery, convenient means of transportation, and ultraconveniences of modern life all tend to make us less active physically, and it appears to us that the increasing curve of carcinoma closely approximates the inauguration

of the Age of Machinery."

The authors advance the working hypothesis: "That human carcinoma may be the reaction to and the result of chronic irritation of adult epithelial tissue bathed in body fluids altered by certain metabolic products as a result of deficient muscular activity. From a study of the carcinoma deaths among males in Minnesota for three years it appears that the death rate in those who are active is greatly exceeded by the death rate in those who are inactive. From a study of the death rates of those who are actively engaged in a gainful occupation it appears that the death rate is lowest in those occupations involving the greatest amounts of necessary muscular activity, and is highest in those occupations involving the least muscular activity. The age incidence factor of the cases studied does not explain the variations shown."

Central Bone Tumors and Their Differential Diagnosis: With Special Reference to the Latent and Unhealed Bone Cysts in Adults. Joseph Colt Bloodgood, M. D., Minnesota Med., 5:604, October, 1922.

THE AUTHOR reported in the Journal of Radiology, for March, 1920, fifty-four cases of bone cysts, in six of which the onset occurred after the age of twenty. He reviews these six cases, and propounds the question, "What shall be our procedure of attack when an adult comes under observation with an x-ray picture showing the central lesion with an intact bony shell, with or without evidence of a recent fracture?"

The possible central lesions are benign giant cell tumor, central sarcoma, bone cysts, chondroma and myxoma, tuberculosis, chronic osteomyelitis, multiple myeloma, metastatic tumors, and multiple primary central sarcoma.

"When is exploration justifiable in central bone lesions with intact shell, with or without recent fracture?" This refers to central lesions in patients over fifteen years of age. The unhealed bone cyst should be curetted. The central giant cell tumor does not require radiotherapy; it will not recur if curetted properly with chemical or thermal cauterization. If a chondroma or myxoma is revealed by operation, curetting with cauterization offers more hope than radiotherapy. If the rare central sarcoma is revealed by the operation, it would seem justifiable to curette with the cautery, with chemical disinfection, followed by radium in the bone cavity. If one explores a central tumor with an intact bony shell and is unable positively to rule out sarcoma, the treatment should be most thorough destruction with the cautery, then swabbing the bone cavity with pure carbolic acid and alcohol and 50 per cent chloride of zinc, following this by the introduction of radium, and this should be followed up by postoperative x-ray and radium treatment.

W. W. W.

Unusual Cases Showing the Diagnostic Value of the X-ray. Lester J. Williams, M. D., New Orleans M. & S. J., 75:177, October, 1922.

FRACTURE of the tibial spine, osteochondroma, Schlatter's disease and Perthes' disease are the types of cases selected by this author to illustrate the value of x-ray methods of diagnosis.

The fracture of the tibial spine made a complete recovery with normal function restored. The case of Schlatter's disease had followed an injury, but there was quite a decided suggestion of some endocrin factor as a predisposing cause. The Perthes' case gave no history of injury or antecedent infection; the deformity was quite marked, owing to its comparatively long standing when examined.

W. W. W.

Experimental Rickets in Rats: VII. The Prevention of Rickets by Sunlight, by the Rays of the Mercury Vapor Lamp, and by the Carbon Arc Lamp. Alfred F. Hess, M. D., Lester J. Unger, M. D., *and* Alwin M. Pappenheimer, M. D., J. Exper. Med., 36:427, October, 1922.

"YOUNG RATS on a diet low in phosphorus can be protected from rickets by irradiations with sunlight for about fifteen minutes daily. In the winter months this degree of light was found insufficient. The effective rays of the sun, in the intensities studied, did not penetrate window glass. They manifested some protective value after reflection from a smooth white surface.

"Irradiation of a few minutes with the rays of the mercury vapor lamp suffices to protect rats against rickets. This is true likewise of the rays from a carbon arc lamp. A standard protective dose of radiation can be formulated for rats on a standard diet.

"Light is able to prevent the occurrence of rickets in rats fed a rickets-producing diet characterized either by a low phosphorus and high calcium content, or a high phosphorus and low calcium content.

"Moderate variations in temperature do not alter the effective action of light rays. Pigmentation of the skin markedly lessens their effect, as demonstrated by the failure of a standard dose to protect black rats."

Experimental Rickets in Rats: VIII. The Effect of Roentgen Rays. Alfred F. Hess, M. D., Lester J. Unger, M. D., *and* Joseph M. Steiner, M. D., J. Exper. Med. 36:447, October, 1922.

THE PROTECTIVE value of soft roentgen rays on rachitic rats was tested out and it was found that "rats on a low phosphorus diet cannot be protected from the development of rickets by exposures to soft roentgen rays such as were employed in this study."

In addition to the preventive test a series of rats were subjected to massive doses of roentgen rays to see if the resultant cell damage might lead to rickets, but these rats "on a diet containing phosphate in an amount adequate to prevent rickets were not rendered rachitic by exposure to massive doses of roentgen rays of an intensity sufficient to produce marked destruction of the blood forming cells of the marrow."

Absence of the Radius with Double Ulnae. Carl Mau, M. D., Ztschr. f. orthop. Chir., 42:355, June, 1922.

SIMILAR cases first described by Kummell, Carre and others who reported cases of double radii with double thumbs and absence of the ulna are reviewed before the author describes his own case, which was that of a boy nine years of age when the case came under the author's observation. The radius was absent in the left member, two ulnae were present, the thumb was absent and there had been eight fingers previous to surgical removal of some of these.

Examination revealed some atrophy of the muscles of the shoulder and arm of the left side; the left elbow was somewhat wider than normal, the olecranon process could not be felt, but one could feel two lateral prominences and one central projection. Some functional changes were recognized, which, however, did not very markedly interfere with the patient's routine.

The roentgenogram was very interesting. It showed both bones of the forearm to be ulnae, the medial and the lateral sides of the forearm were symmetrical in every particular. The two olecranon processes occupied the median and lateral lower ends of the humerus. No olecranon fossa was observed. Eleven of the carpal bones were seen and the navicular bone was absent, as would be expected in the absence of the radius. At that age the pisiform bone had not yet appeared. There seemed to be two sets of the remaining six bones, but one was missing due to the surgical interference men-

tioned above. Of the digits and their metacarpals, no thumb metacarpal was observed as all had proximal epiphyses, while the thumb had a distal epiphyysis.

A. M. P.

The Roentgenological Aspects of Achylia Gastrica. A. W. Crane, M. D., Am. J. Roentgenol., 9:527, September, 1922.

ACHYLIA gastrica is used by this author in the sense of "An established chronic disease of the stomach characterized by the persistent absence of free hydrochloric acid in the stomach contents during the whole of the digestive cycle."

The importance of achylia gastrica to the roentgenologist lies in its frequency of occurrence in gastro-intestinal cases, its association with abdominal pain and intestinal disturbancs, and in "the differences in the interpretation of the same roentgen ray signs, according to whether or not achylia is present."

A single sample of the stomach contents is never sufficient evidence to establish a diagnosis of achylia gastrica. In the one thousand cases forming the basis for the conclusions drawn in this paper the stomach contents were obtained in five to six fractions taken at intervals of fifteen minutes.

Achylia was found in 158 of these cases, 12.6 per cent, and in not one of the 158 was ulcer ever found. Of 393 cases showing a hyperacidity, 117 showed duodenal ulcer and 25 showed gastric ulcer. Pain was present in 102 of the 158 cases of achylia gastrica though study of the causes leads to the conclusion that achylia itself is not often accountable for pain. If gastric cancer or syphilis can be excluded then the cause of the pain probably is not in the stomach.

The literature is cited to support the view that diarrhea is often present in cases of achylia. Twelve of the 158 cases in this study complained of this ailment. This condition may sometimes explain rapid expulsion of barium meal with intestinal hypermotility.

Carcinoma of the stomach cannot be distinguished from syphilis of the stomach by clinical, laboratory or x-ray methods, nor even by an exploratory laparotomy. Tuberculosis and circulatory diseases and dental infection should be eliminated from the diagnosis before a diagnosis of achylia is rendered. Pernicious anemia and gastric cancer may present very much the same clinical picture, but proper interpretation of roentgen findings will usually clearly differentiate the lesion. Duodenal ulcer and achylia may cause the same stomach symptoms and make differentiation very difficult.

Further Studies of the Internal Organs of the Newborn. E. Vogt, M. D., Fortschr. a. d. Geb. d. Roentgenstrahlen, 29:405, April, 1922. (See J. Radiol., 3:150, April, 1922, for abstract of previous study.)

HILUM shadows are entirely absent in the normal newborn child, because of the softness of the bronchi, absence of glands, and the small size of the vessels.

The author has observed a number of cases of thickened lung markings in newborn and prematurely born infants. This thickening could not possibly have resulted from respiratory conditions and the author came to the conclusion that the lung markings represent the vascular system in the lungs. This conclusion was further substantiated by the fact that an injected lung vascular system showed injected vessels corresponding to the normal lung markings of the same patient. Thickening of these lung markings was also found in conditions of heart disease with congestion of the small circulation.

The author's roentgen medico-legal test to determine whether there has been postpartum life depends upon whether air is found present upon roentgen examination of the gastro-intestinal or respiratory tract. This test has failed, however, in at least one instance when no air was found present in a prematurely born child known to have lived ten hours after birth. The outhor explains this phenomenon by the fact that the immature, weak infant needs very little air; that the absence of a sufficient quantity of carbon dioxide gives rise to no need of air, and that the musculature was too weak to bring about appreciable expansion of the chest. The same thing is true in malformations and the author reports a case of obliteration of the esophagus where the chest was well expanded, but there was not a trace of air in the gastro-intestinal tract.

In gastro-intestinal observations the author found that in a child ten days old the splenic flexure is much above the hepatic flexure, the ascending colon is rather short, the descending colon is usually slightly to the right of the midline, and the sigmoid flexure is at about the crest of the ilium. The sigmoid and the colon in general were found to be very mobile, a condition which is often the cause of Hirschsprung's disease.

The adrenal gland consists chiefly of capillaries, according to this author. This was determined from the fact that an injection of the vessels resulted in an enlargement three and one-half times the normal size. The hair-like capillaries could be easily demonstrated on the plate. This explains the frequency of hematomata in the newborn, often a cause of death.

The capacity of the urinary bladder of the newborn was found to be about 40 cc. Its shape when filled is oval, when not filled it is pear-shaped. When filled the bladder reaches out of the pelvis to about the level of the navel. The peritoneal covering is limited to the top of the bladder, while the anterior wall is free from the peritoneum.

A. M. P.

The Duration of the Passage of Ingesta Through the Gastro-Intestinal Tract of Infants. Walter Kahn, M. D., Ztschr. f. Kinderh., 29:321, July, 1921.

THE AUTHOR notes that there is a general lack of definite data on this point. He himself has made a number of observations using in the otherwise normal meal small admixtures of substances such as wood charcoal, animal charcoal, carmine, and licopodium powder, which could easily be recognized both macroscopically and microscopically in the excreta. The x-ray was used to determine the length of time the meal remained in each of the individual parts of the gastro-intestinal canal.

The following are the data from the above study: (1) The duration of the passage of the ingesta through the gastrointestinal canal in infants is rather short, ranging between four and twenty hours, and being about fifteen hours in the majority of cases. (2) In the early morning hours duration is generally shorter than at any other time of the day. (3) The duration is shorter with breast fed infants than with bottle fed ones. (4) The emptying time of the stomach is at most four to five hours. The small intestine is empty after seven to eight hours. Passage through the large intestine ranges from two to fourteen hours.

A. M. P.

A New Sign to Distinguish Between Carcinomatous and Non-carcinomatous Stenosis of the Esophagus. Eugen Weber, M. D., Fortschr, a. d. Geb. d. Roentgenstrahlen, 29:362, March, 1920.

IN 75 cases of definitely proven carcinomatous stenosis and in 16 cases of definitely proven non-carcinomatous origin the author's sign was found correct. The patient is given about 30 cc. of an opaque meal under fluoroscopic observation. In a few minutes, when the meal is still seen in the esophagus above the stenosed area, the patient is asked to state whether it has passed through or not. In carcinomatous stenosis the reply is positive, while in non-carcinomatous stenosis the patient

feels that the meal is still in the esophagus.

The author attributes this loss of sensitiveness in the esophagus to a gradual infiltration by carcinomatous tissue of the area of carcinomatous growth. In non-carcinomatous stenosis the mucosa is unchanged and so retains its sensitiveness.

A. M. P.

Reports of the First Bilingual Congress of Radiology and Electrotherapy, Continued (four abstracts). Discussion on the Abnormal Stomach. Arch. Radiol. & Electroth., 27:66, August, 1922.

MR. J. MAGNUS REDDING stated that in his practice it was the rule to rely upon the radiogram for confirmation of screen findings and ultimate diagnosis and that screen findings alone would never be considered sufficient.

His discussion dealt almost entirely with "the so-called 'area of localized tenderness' over some part of the stomach or duodenum frequently quoted by the radiologist as confirmatory of a diagnosis of ulcer, or as warranting a suspicion of such a lesion." Diagnosis of gastric and duodenal ulcer, he believes, should depend upon the recognition of the deformity in visceral outline produced by these lesions and he does not believe that tenderness is of any great moment in these cases.

Tenderness never appears over the stomach or part of the duodenum unless the part is adherent to the parietal peritoneum, which condition is not nearly so frequently found as is gastric and duodenal ulcer. In the vast majority of gastric and duodenal cases tenderness to pressure is due to hyperalgesia of the skin, muscles and connective tissue. Even when an ulcer had been positively and definitely located the area of tenderness, if present, does not shift with the change in position of the ulcer which shifts its position to some degree with every change of posture. The only exception to this last statment is an ulcer intimately adherent to the pancreas or anterior parietes. Only in exceptional circumstances and after the most thorough investigation will tenderness ever be found associated with any particular area of the underlying organs.

PROF. M. R. J. HAYS suggested that gross palpation be done with the gloved hand operating through the smallest diaphragm with a minimum amount of current, and that finer palpation be done with the ungloved hand and the current turned off.

DR. ROWDEN said that he considered marked pyloric obstruction with a small stomach in a well nourished individual to be strongly indicative of malignancy, while the same obstruction with a large stomach in a thin individual he considered to be against malignancy.

He prefers the single meal in examination, observation extending over six to seven hours, to the double meal.

DR. R. CONNELL mentioned the case of a patient whose stomach, while under fluoroscopic examination, was seen suddenly to drop several inches and the next instant the patient had fainted. This illustrates the suspensory action of the oblique muscle fibres of the stomach and shows that there may be a basis of fact back of the "sinking sensation" experienced in fainting.

DR. G. B. BATTEN advocated routine examination, both by screen and plates, first in the upright position and then prone upon the abdomen.

DR. THURSTON HOLLAND in closing the discussion advised both screen and plate examinations and expressed himself as opposed to the standard meal. Each worker must, of course, have a standard meal routine examination, but in individual cases he should use any combination of barium and other things as he sees fit. No one meal can be taken as final in every case.

Problems in Radiotherapy. Robert Knox, M. D., Arch. Radiol. & Electroth., 27:69, August, 1922.

THE MOST urgent problem of deep therapy is the standardization of the dose. The solution of this problem would be well begun if an effect upon a particular tissue could be associated with a particular wave length. After this problem is solved there remains the technique of x-ray and radium treatment.

The Seitz and Wintz "unit skin dose" (U.S.D.) means the amount of radiation which will after eight days produce a slight erythema and will after four weeks produce a slight tanning of the skin. Seitz and Wintz have made the arbitrary figure "100" represent this U.S.D. on the basis of which they have determined the other doses, e. g., 60 to 70 per cent of the U.S.D. is taken as the sarcoma dose, 90 to 110 per cent is taken as the carcinoma dose, etc. The author states that time alone will allow of definite conclusions regarding lethal dosage, although marked advances in technique have been made "and if it were not for the very variable biological response of the tissues the value might be regarded with more certainty." He does not believe that we are on the eve of a certain cure for cancer, as the problem is too deep and too elusive to be so easily solved, but he does admit that greater relief has come from the experience and study of recent years.

The Freiburg and the Erlangen technique requires an overlapping of beams which involves the risk of overexposure of healthy tissue and in addition to this objection there is the one that treatment has to be suspended from time to time to allow the blood to recover from the effects of the rays.

The staff of the Cancer Hospital of London devised a rotating tube mechanism by which the proportion of the skin dose depends upon the circumference of the circle used. A diminution of skin effect is secured by moving the tube in a circular manner, thereby distributing the dose over an area equal in size to that of the circle. Angling the tube conveys the beam to the focus spot, which hardly varies in extent or depth when the tube is accurately centered. A further step in this technique led to rotating the patient instead of the tube. This is done so slowly that the patient is not conscious of it, an hour or more is required for one complete revolution of the table upon which the patient lies. This makes it possible to completely protect the operator and patient by inclosing the tube in a box lined with thick lead, an oil bath surrounded by lead is preferable.

The skin erythema dose this author regards as a very unsatisfactory basis for the estimating of deeper dosage, and he advocates an endeavor" to obtain a standard biological reaction obtained under standard physical conditions." Closer collaboration between physicists and radiologists may lead to the development of more precise methods. The same tumor varies greatly in its response to radiation at different times in its life history.

Operation whenever possible is recommended. It should be followed by x-rays or radium treatment.

In the discussion of this paper Mr. W. Sampson Handley said that while he did not believe that radiology would ever displace surgery, he did believe it to be an indispensable aid in cancer therapy.

On the Use of Radiotherapy. Drs. R. Proust, L. Mallet *and* R. Coliez, Arch. Radiol. & Electroth., 27:89, August, 1922.

DRS. Proust, Mallet and Coliez reported the establishment of a department of deep therapy at the Hospital Tenon, Paris. There are separate rooms for deep x-ray therapy and for radium applications, a pathological laboratory where sections are quickly diagnosed, a ward of twenty beds for women and one of sixteen beds for men.

This department of the hospital has been in operation since January, 1922, and 110 cases have received treatment

within that time. The technique has been that used by Caseman and Knox. Promising results have already been secured in various forms of malignancy. The authors of this paper believe that the time is soon coming when deep therapy will be the treatment of choice in all forms of uterine malignancy.

Discussion of Deep Therapy, Arch. Radiol & Electroth, 27:91, 1922.

DR. SABERTON emphasized the value of cooperation of the physician, surgeon, pathologist, physicist and nurse in all cases where massive dosage is employed and advocated the establishment of institutional treatment in suitable centers.

He emphasized the importance of doing everything possible to increase the patient's powers of resistance before massive treatment is undertaken and also emphasized the importance of after care.

As to the Erlangen school he differs from them in his estimate of the value of previous ionization of the growth with coppr salt to increase scattered radiations. Except in the case of ulcerated surfaces he does not believe there is any value in doing this. He also differs from them in his estimation of the so-called stimulating dose to cancer cells, regarding this as a very difficult thing to determine. He favors operative measures whenever possible and believes very strongly that preoperative treatment is desirable.

PROF. H. R. J. HAYES in his discussion described the use of a simple device, similar to a lavatory seat, for the treatment of superficial perineal lesions. Full description of this method is reserved for later publciation in the Archives. He also described a brass catheter one millimeter thick for use in the treatment of the prostate gland.

DR. CURTIS WEBB also favors operative treatment whenever possible, and, like Dr. Saberton, does not advocate previous ionization treatment. He stated that the radiologist should have equal consideration with the surgeon. When the latter has done his best in his efforts to save a patient and failed he receives generous consideration; the same should be true in similar circumstances of the radiologist.

MR. HAYWARD PINCH said that he regarded deep radium therapy by means of buried tubes as the method *par excellence*. Deep radium therapy, he stated, ought to mean the use of two to seven grams of radium applied to one patient, and he hopes to be able to carry out this form of therapy at the Radium Institute in the near future.

Accessory methods of treatment include x-rays, a liberal vitamin B diet and the use of collosol solutions of heavier metals, especially copper and silver. He has found injections of these very helpful in several instances.

Nausea, malaise and diminished resisting power to bacterial infection, and diminished response to irradiations are all sequelae of radium treatment which offer research problems. He includes here the sequel relating to the internal secretions and states that he does not believe that crossfire can be so concentrated as to effect only the ovaries; he believes that the pancreatic and renal secretions may be disastrously affected by such treatment.

Technical and Clinical Aspects of the New Deep Roentgen Therapy. James T. Case, M. D., F. A. C. S., Am. J. Roentgenol., 9:530, September, 1922

THE RESERVE of the most skeptical must be shaken by the evidence presented in German clinics where the "new" roentgen therapy is being used, even after allowing for overenthusiasm. The reports from these clinics, the writer believes, should be accepted with reserve, but this should be unaccompanied by skepticism.

The writer reports that upon his visits to these European clinics he found "more constant and more pronounced immediate palliation in a larger percentage of cancer cases, and, with some, complete disappearance of signs and symptoms of the disease * * *."

Seitz and Wintz, Opitz and others have completely abandoned operative treatment in cases of uterine cancer, but the writer of this paper does not regard this as a wise procedure just yet, though time may prove it to be so.

Roentgen Treatment of Diseases of the Generative Organs. I Seth Hirsch, M. D., New York M. J., 116:68, July 19, 1922, *and* 116:208, August 16, 1922.

THIS ARTICLE, running through two numbers of the above journal, is a very complete and conservative presentation of the subject.

The radiologist is but the assistant of the gynecologist in these cases. He must apply the rays with brains and talent, adhering to certain fundamentals, but remembering that he is dealing with a human being. The gynecologist's function is to select the cases for treatment.

There are five great causes of uterine bleeding—pregnancy, infection, displacements, lacerations, neoplasms and endocrin disturbances. Only the latter two concern the radiologist. X-ray is useful in the treatment of excessive or prolonged hemorrhage, benign tumors, malignancy, sterilization, and diseases of the vulva.

In giving treatment the radiologist must heed certain fundamental considerations, namely the following: Cellular reaction depends upon the absorption of x-rays; the reaction is the same, whatever the wave length, if the energy is absorbed; cells vary in reaction; the lethal dose of certain wave length rays has been established for certain cells, both benign and malignant; both the local effect and the general reaction must be considered when applying the rays; there is no one standard maximum dose.

Through the use of instruments of relative precision the entire technique is being established on a sound scientific basis.

The physical dose is the energy absorbed in a volume unit of substance and is estimated by subtracting the quantity of energy remaining on the under surface of the unit of absorbing medium from that falling on the upper surface. The distribution of the dosage through the mass of the medium is very different, and in treating human tissues, many factors besides the physical dose must be considered.

Since the skin is the great barrier and must be conserved, the estimation of the erythema dose is necessary.

The biological dose is the physical dose multiplied by the sensibility coefficient of the tissue. The deep biological reaction is now measurable by the ionization chamber. The biological dosages of Seitz and Wintz are quoted, with the remark that they must not be accepted as absolute.

The dose quotient is the ratio between the surface dose and the deep dose, and the aim of deep therapy technique is to keep this quotient as small as possible, aiming to get as high a deep dose percentage as possible. The value of the dose depends on three factors: (1) The absorption of rays by overlying tissue. The dose quotient is smaller the more penetrating the radiation and the more homogeneous the rays by heavier filtration. (2) The dispersion of the radiation. The dose quotient is smaller the farther the source of radiation. (3) The scattering of the radiation. The dose quotient is smaller the greater the scattering, and this is increased by increasing the focal distance and enlarging the size of the portal. These three factors are discussed in detail by the author.

The x-rays should be centered upon the organ they are designed to affect. In gynecology, it becomes necessary to determine the relative position of the ovaries to each other and their projection upon the surface of the body, together with the depth of the ovaries from the abdominal wall. In the average case a square three centimeters in

size with its inner border three centimeters from the median line, and its upper border at the interspinous line, will, in ninety per cent of the cases, include the ovary. The average depth is six and a half centimeters on the right and six centimeters on the left. The ray must be so gauged, then, that it will be administered at a depth of six centimeters in the square mentioned.

The uterus in carcinoma is considered to be ten centimeters below the surface.

With the older technique of numerous small portals and crossfiring, sterilization was easily accomplished, since the necessary thirty-four per cent was easily delivered to the ovaries, but malignancy was hardly affected. A complete revision of this technique has been made, and treatment is given through larger portals and the aim is to deliver to a selected area beneath the surface a definite dosage. This may be given by complete dosage at one session, or by divided dosage through several sessions. In determining these, both the local changes in the pelvic organs and the systemic response must be considered.

In carcinoma it is a great advantage to administer the desired dosage within as short a time as possible. Since many patients cannot stand the necessary eight to twelve hours, at one session, it may have to be spread over two to four days; it can be further shortened by radiating by two or more tubes simultaneously. However it is given, when the full skin dose has been given through each skin area, the series is complete and it becomes necessary to wait until both skin and systemic reactions subside.

Myopathic hemorrhage requires a careful selection of cases, because while radiotherapy is effective and will produce amenorrhea, this is not always desirable. In women near the menopause and having climacteric hemorrhage, radiotherapy is the best treatment.

In fibromyomata, there are three theories as to the mechanism by means of which radiation will reduce the size of the tumor: (1) an artificially produced atrophy similar to that which occurs at the menopause; (2) direct action on the muscular tissue; (3) endarteritis thereby starving the tumor. The factors to be considered in determining the mode of treatment are: age of patient, characteristics of tumor, complications.

In general it may be stated that hemorrhage due to fibroids should be treated by radiotherapy in those women in whom a permanent menopause is not objectionable. Even if severe, the menopausal symptoms are to be preferred to an operative risk, since the symptoms can be fairly controlled by organotherapy.

The old technique of many small fields has given way to that of larger fields and heavier filtration. With a peak voltage of 200,000, 5 ma. at 35 cm. distance, filtered through 0.5 mm. of Cu and one mm. of Al, the treatment is administered through four fields, two abdominal and two dorsal, in four sessions within two to eight days and at the end of the menstrual period. Fifty per cent of the full skin dose is applied to each portal. When radium is used as a substitute for x-rays, 50 mg., properly filtered, are inserted into the uterine cavity for twenty-four hours, or less, depending on the patient's age.

The gynecologist must weigh the advantages and disadvantages in determining whether radiation treatment shall be used. The advantages are that the treatment is painless; in properly selected cases there are no failures; the menopause is not usually attended by any severe nervous symptoms; treatment takes one to eight weeks, and if it fails operation is still available; there is no mortality if the cases are properly selected. Disadvantages: There is a definite time period before a cure is effected; the fibroid may only partially disappear and, in rare cases, may recur; malignant changes may be present and be overlooked, or malignant changes may take place in the fibroid. The crux of the entire treatment of fibroids by radiation is correct diagnosis.

In carcinoma, the patient to be submitted to radiation must be considered in the same light and from the same viewpoint as the patient about to undergo a severe surgical operation, as far as regards preliminary management, radiation and postradiation treatment.

The technique of successful radiation for cancer demands: (1) radiation of the proper quantity and quality; (2) the administraiton of the lethal dose of this radiation to all cancer cells at the varying depths at which they exist; (3) the administration of this dose in such a manner that the local resistive power of the normal cells about the cancer are not depressed and the general resistance of the whole organism is not appreciably lowered. The question of the lethal dose of the cancer cell is not a simple matter, and any sweeping statement with regard to cancer dosage must be taken with caution. The clinical study of the case is now the sole guide in the determination of the size and frequency of the dose.

The author discusses the technical difficulties in connection with treatment of uterine carcinoma, and the use of radium as an adjuvant, detailed discussion of which cannot be given here.

Sterilization is indicated in (1) dysmenorrhea which is not infective, the dosage in this condition not being sufficient to produce complete castration; (2) after Caesarian section; (3) in osteomalacia; (4) in severe tuberculosis; (5) where social reasons are sufficient to make the measure justifiable and permissible.

W. W. W.

Treatment of Cancer of the Breast. Frederick H. Kuegle, M. D., Minnesota Med., 5:888, October, 1922.

SINCE, even with the best of surgery, the ultimate history of breast malignancies is anything but encouraging, the attention naturally turns to the value of radiant energy as an adjuvant to surgery in such cases. The question is considered under three headings: (1) as a pre-operative measure, (2) as a post-operative measure, (3) as a palliative in recurrent and inoperable cases.

From the best figures available, an established breast cancer with palpably affected axillary nodes, has about one chance in 25 of being cured by operation. If intensive x-radiation is administered by approved modern technique there will be marked recession of glandular enlargements, the cancer cells will be killed or encapsulated, the smaller lymph channels will be obliterated and tendency to metastases lessened. These are all desirable accomplishments, and if a period of three to four weeks is then allowed to elapse, operation will be attended with a minimum risk.

Statistics show that more than one-half of all operated cases recur within four years, so that any method of treatment which can be used as an adjuvant to surgery, and which will retard this high percentage of recurrence, should be used. Every case of breast cancer which is operated and confirmed by pathological examination should, therefore, receive postoperative x-ray treatment. Properly administered this treatment will give definite results; any deep-seated cancer cells which have escaped the knife will be killed outright, or be so attenuated in virulence that they can become encysted. The operative scar will be rendered soft and pliable and entirely painless.

As a palliative in hopeless cancers, no other known treatment approaches the usefulness of radiotherapy in relieving pain and foul discharges and in making the terminal stages comfortable.

W. W. W.

Radium in the Treatment of Diseases of Women. W. H. B. Aikins, M. D., L. R. C. P., F. A. C. P., New

York M. J., 116:340, September 20, 1922.

IN CANCER of the breast, it is now generally conceded that pre-operative raying is most important; also every patient whose breast has been removed for cancer should have postoperative raying, which may be given early before the sutures are removed. All inoperable cases should be given the chance which radiation affords.

In chronic mastatis, it would appear that radiotherapy justifies a change from the former stand that operation should be done to prevent carcinoma.

In carcinoma of the cervix, the tendency is away from operation; Ochsner set the pace by announcing in 1921 that he was no longer operating cervical carcinomas. In all stages radium gives results superior to those of surgery. The author prefers comparatively small doses of radium, the total amount being from 1,500 to 2,000 milligram hours, repeated in six weeks if necessary.

The effect of radium on fibroids has been so definitely established as to make radium a specific for certain types of this condition. The author has treated sixty cases with constant results, namely, cessation of abnormal bleeding, resulting in menopause in many cases, marked decrease in size of the tumor, and a marked improvement in general well-being. Smaller doses at six weeks intervals are preferred.

The effect of radium in leukorrhea is often remarkable, several cases cleared up entirely under radium treatment.

In menorrhagia and metrorrhagia not associated with fibroids, most brilliant results are obtained; when these symptoms are caused by hemorrhagic metritis, uterine sclerosis or fibromata, radium will produce a cure; it is a "true uterine styptic."

W. W. W.

Carcinoma of the Cervix. B. C. Garrett, M. D., New Orleans M. & S. J., 75:165, October, 1922.

A SURGEON'S ideas of the place of radium in the treatment of cervical cancer is given in this paper.

While recognizing the fact that many very capable men have stopped operating upon cancer of the cervix in any stage, the author has not been convinced that radium should supplant surgery in early involvement.

Where the involvement has extended beyond the cervix, the author has discarded the cautery and uses radium, followed in suitable cases by surgical removal.

In the far advanced cases, radium is palliative, while surgery is not indicated at all. W. W. W.

Teratomas and Their Relation to Age. H. E. Himwich, *Cornell University, Medical College;* J. Cancer Research, 6:291, October, 1921.

TERATOMAS are defined by the author as "tridermal embryonal rests endowed with a certain amount of possible growth, that is, growth potential." If the rest is comparatively large, considerable growth potential has been consumed before birth; smaller rests have a slight early growth followed by inhibition and, should conditions permit, they have a later postnatal growth.

"The growth of the host inhibits that of the embryonal rest and the number of teratomas appearing in any given time varies inversely with the growth potential of the host and directly as that of the embryonal rest." Teratomas appear most commonly at the period when the host's growth stops, namely, at from 23 to 29 years of age.

If growth starts because of trauma then malignancy is far more apt to result than in growth resulting from simple growth potential; also, the teratoma is frequently monodermal. If a developed inclusion is traumatized the cell will often be like that of acquired cancer, but if the inclusion is undifferentiated the cell is more apt to be of an embryonal type.

"The curve of carcinoma testis rises and falls in a manner similar to that of teratoma testis and not like that of old age cancer. This is another fact which may be adduced in support of the theory that carcinoma testis is a one-sided teratoma. In the female a similar neoplasm might be expected to arise as the result of the physiologic stimulations of puberty. This is what actually takes place, hence the growth is, in all probability, of teratomatous origin.

"* * * In the old the inhibition of the organism is almost negligible. Hence trauma at that time may readily be followed by an uncontrolled and therefore excessive growth. Thus, loss of growth restraint may be almost as important a factor in the etiology of acquired cancer as in that of congenital inclusions."

The bibliography is a guide to extensive reviews of the subject.

An Atypical Adenoma of the Pancreas Originating in Islet Tissue. Harry Goldblatt, *Western Reserve University School of Medicine;* J. Cancer Research, 6:277, October. 1921.

TRUE simple adenomata of the pancreas arising from the islands of Langerhans are very rarely found and the diagnosis is difficult to establish. All such tumors heretofore described in the literature have been very small, the largest being 11 mm. in diameter.

The adenoma occurring in the author's experience measured 4.5 by 3.5 by 2.5 cm. and was imbedded 10 cm. from the tip of the tail of a pancreas whose total length was 15 cm. The patient, a woman 55 years of age, had for two years been troubled with looseness of the bowels, which finally developed into a severe diarrhea, the effects of which did not, however, confine her to her bed until two months before her death. Indigestion of various food elements (fat, meat and banana) was noted at different times, but no laboratory examination of stools was made. The clinical examination showed no abnormality of lungs, heart, abdomen or nervous system, but at autopsy in addition to the tumor findings there was found slight chronic interstitial nephritis, fatty metamorphosis of the liver, subacute enterocolitis, and slight passive congestion of lungs, liver, kidneys and intestine.

The tumor was found to be definitely and completely encapsulated with no signs whatever of direct invasion or of metastasis. There were no mitotic figures. The general arrangement of the tumor was not unlike that of some cellular adenomata found in other organs of the body. The cells of the tumor very closely resembled those of the islands of Langerhans in their size, shape, staining characteristics, and the minute structure of cytoplasm and nucleus. It was, therefore, deduced that the tumor was benign.

Report of a Case of Leukemia Cutis and Treatment of Four Cases of Leukemia with Radium and X-ray. Texas State J. Med., 18:158, July, 1922.

AN ENORMOUS spleen and general adenopothy was present in the first patient here reported, who came for treatment in September, 1920. A diagnosis of splenomyelogenous leukemia was made and radium treatment was applied over the spleen, and x-rays over the long bones. Three series were given. After one year the patient returned with skin manifestations; the underlying condition was again treated and the condition after four months' treatment again returned to a satisfactory stage.

Three other cases are given in some detail as to blood findings and clinical course, but lacking technical information as to the radium and x-ray applications. The author agrees with Ordway that radiotherapy is the safest and most prompt palliative measure in chronic leukemia, and radium frequently will affect cases which are refractory to benzol or x-ray. W. W. W.

Carcinoma of the Antrum. D. Crosby Greene, M. D., Am. J. Roentgenol., 9:591, September, 1922.

RESULTS to date in 84 cases of carcinoma of the antrum treated at the Huntington Memorial Hospital are reported in this paper. The data are as follows:

Method of Treatment		Not Traced	Well	Dead	Recurrence	Worse
None	6	2	..	4	..	..
Operation	8	2	1	5	..	..
Radium	32	7	1	24	..	..
Op. & Rad.	37	2	12	19	3	1

Of the 19 deaths listed in the last set of figures, 11 were from recurrence, 3 from metastasis without recurrence, 3 from meningitis following operation, 1 from hemorrhage following operation and 1 from a disease in no way connected with the original trouble.

Of the 12 listed as well after postoperative treatment, the period of time free from recurrence varies from one to five years since operation.

Syphilis of the Colon. J. P. Keith, M. D., Southern M. J., 15:709, September, 1922.

SYPHILIS of the colon is not so rare as the infrequent mention of it in the literature would lead one to believe, according to the experience of this author, and he submits three case reports.

The main difficulty in diagnosis is in differentiation between malignancy and tuberculosis. A gumma with ulceration may give a radiographic picture very similar to that of malignancy. Where the syphilitic stricture is smooth, especially if it is multiple, the absence of pain and of a positive Wassermann are aids in differentiation. Tuberculosis usually involves the cecum and ascending colon, while syphilis is more likely to occur in the transverse and descending colon. Syphilis does not have the intolerance to filling that tuberculosis has.

W. W. W.

Ultraviolet and X-ray as Physiologic Complements in Therapeusis: A Newly Established Clinical Treatment. C. M. Sampson, M. D., Am. J. Roentgenol., 9:570, September, 1922.

AN ACTINIC erythema imposed upon a skin surface which has just received a dermatitis dose of x-rays is, according to many roentgenologists, against all rules of the game. The writer replies to this that he has followed just this procedure for a number of years and he has yet to find a case of depilation or any symptom indicative of dermatitis.

The skin is the natural filter which nature has provided against harmful effects of the sun, but at the same time this natural filter is permeable to adjuvant actinic effects.

The epidermal pigmentosis which follows an artificially induced ultrasunburn reacts in such a way "that the area involved, when exposed to relatively soft rays, permits of the assimilation by that part of a greater quantity of physiologic roentgen radiation, at the same time precluding the physiologically detrimental effect that would otherwise be produced on the area of skin unexposed to intense actinism."

The principle derived from the foregoing facts is that x-rays closely allied to ultraviolet activity can exert their helpful influences without exercising their harmful ones. "Ultraviolet and x-rays are physiological complements. The one may be used in symbiosis with the other. That is, the ultraviolet applied first renders the area more resistant to the subsequent radiation with the roentgen rays. The roentgen rays applied first may produce a dermatologi- change injurious to the organism; but the effects of that in jury can be alleviated or entirely neutralized by applying secondarily the ultraviolet radiation."

Roentgen Therapy of Hyperthyroidism. I. W. Jenkins, M. D., Texas State J. Med., 18:213, August 1922.

RADIOTHERAPY is applicable only to the exophthalmic or hyperplastic and the toxic adenoma. All other forms should be treated surgically or medically. In selecting the kind of treatment Holmes' classification is useful, namely: (1) colloidal, cystic or simple goiter; (2) malignant goiter; (3) toxic adenoma; (4) nontoxic adenoma; (5) exophthalmic goiter.

In malignant goiter, if operable, surgery should be used, preceded and followed by radiotherapy.

Always there should be a thorough physical examination, since hyperthyroidism may be a secondary manifestation of some focal infection. When menstruation is excessive without detectable pathology, raying the ovaries is indicated. Clinical improvement precedes a change in basal metabolism.

This paper was part of a symposium on goiter held by the Surgical Section of the Texas State Medical Association, at El Paso, May 10, 1922.

W. W. W.

Roentgen Treatment of Toxic Goiter. E. W. Rowe, M. D., Nebraska M. J., 7:329, October, 1922.

TREATMENT of toxic goiter by x-ray came into vogue in 1905, but fell into disrepute because many patients seemed worse rather than better after this mode of treatment. Lack of knowledge of the etiology of the disease, faulty technique and inadequate apparatus were the factors accountable for this failure, but within the past few years all this has been changed.

The etiology of the disease and its treatment are all discussed in the original paper and a bibliography of the recent literature is appended.

The author thus sums up his conclusions: "(1) Properly selected cases are as rationally treated by roentgen rays as by surgery. (2) Adolescent toxic cases and early toxic cases yield most readily. (3) Adenoma with toxicity yields less readily, but often gives brilliant results. (4) Exophthalmic goiter shows the best results of all, and if roentgen treatment is faithfully carried out it seldom requires surgery, while the results are just as permanent. (5) Malignancy is no contra-indication. Pfahler reports two cases permanently cured. (6) There is no harm in the treatment and many are cured. (7) There is no fear of operation, less likelihood of recurrence, and no defacing scar on the neck. (8) Three series may effect a cure. Sometimes six or eight are required. (9) The tonsils when infected should, with other foci of infection, be treated. The tonsils may be treated at the same time by the roentgen ray with high probability of relief. (10) Treatment should be given only by or in cooperation with an experienced clinician. (11) The estimation of the basal metabolic rate in the selection of cases will determine the thyroid activity better than any other method. It will help also to visualize the progress of the patient and give a safe indication when treatment should be discontinued."

Differential Diagnosis and Treatment of Some Pulmonary Diseases with Special Reference to Artificial Pneumothorax. Louis Mark, M. D., Ohio State M. J., 18:544, August, 1922.

THE pulmonary conditions which are frequently incorrectly diagnosed as tuberculosis are considered in this paper. In the differentiation of carcinoma, syphilis and abscess of the lung the x-ray findings, when carefully interpreted, aid very materially.

In the initial stage primary carcinoma is usually diagnosed as tuberculosis. Many cases of pulmonary syphilis have been seen by the author during the last few years.

Careful history and careful physical, laboratory and x-ray examinations are all necessary for differentiation of these lesions from tuberculosis.

W. W. W.

X-ray Diagnosis of Diseases of the Lungs. Amedee Granger, M. D., New Orleans M. & S. J., 75:107, September, 1922.

NORMAL lung tissue can be accurately revealed by the x-ray film, but the radiologist must be familiar with normal lung markings and with the characteristic density of the normal lung tissue.

Excluding acute pneumonic infections, tuberculosis is the most common lesion and it must be excluded before any other diagnosis can be substituted. The earliest recognizable lesion of adult tuberculosis is the Dunham fan, usually found in the apical region along the first or second interspace branches. It is formed when the inflammatory exudate at the point of inoculation with the tubercle bacilli, fills the air cells and terminal bronchus of a secondary lobule. Dunham believes that the presence of two or more of these fans of different densities in the location mentioned constitutes a lesion which is pathognomonic of tuberculosis. After the apical lesion the most common one is caseous bronchopneumonia, which usually first invades the upper lobe above the second interspace—then the upper portion of the lower and median lobes—then the lower part of the upper lobe. It may become confluent. Both lungs may be involved, but not to the same extent, as a rule. Acute miliary tuberculosis presents a characteristic picture, with fine studdings more or less evenly distributed throughout both lung fields; the history and clinical picture are necessary to differentiate these from pneumoconiosis. Basal tuberculous lesions without apical lesions are rare, and occur mostly in children.

Watkins has found 172 cases of pulmonary syphilis in 6,500 examinations of the lungs and heart, and 209 cases of syphilis complicating advanced tuberculosis. The types of radiographs may show the following lesions, gummata with syphilitic peribronchial densities, syphilitic peribronchial densities; bronchostenosis with lung collapse and marked deformity. Syphilis and tuberculosis may occur simultaneously in the same chest.

Primary sarcoma is usually lymphosarcoma and is shown as a large single shadow; secondary sarcoma may appear as large or small, usually multiple, rounded circumscribed shadows. Metastatic carcinoma gives fairly regular shadows, apt to be limited to the hilus region. Primary carcinoma is less frequent, but presents a characteristic picture. The invasion may be either infiltrative or miliary.

Cysts may be either echinococcic or dermoid.

Jarvis has shown five stages of pathologic lesions in granite cutters, namely, (1) increase in hilum width and density, (2) increase in trunk markings, (3) densities at the branching of bronchi, (4) appearance of fans indicating accumulation at the periphery, (5) homogeneous haze at the lung periphery.

The writer's technique is to make two 14 by 17 films, one posteroanteriorly and the other a left lateral view, both at a distance of six feet.

W. W. W.

Tubercular Epiphysitis of the Greater Trochanter. D. Y. Keith, M. D., Am. J. Roentgenol., 9:549, September, 1922.

THIS is a report of a tumor occurring over the right hip of a boy 12 years of age. Six months before the roentgen examination the patient had fallen upon this hip and there had been resultant soreness and lameness for about three months following that time.

The roentgen examination showed bone destruction on the superior and external aspects of the epiphysis of the trochanter. This destruction extended to the external part of the adjacent diaphysis for the distance of one centimeter and it ended in a spur of bone about one centimeter in height. In the soft structures above the right trochanteric epiphysis there appeared a shadow measuring two and one-half by five centimeters. It was much more dense than the surrounding soft structures but much more radiable than normal bone and later in the history of the case it was found to be the wall of an abscess cavity.

Roengen diagnosis was: (1) Neoplasm, destructive sarcomata; (2) Osteomyelitis, probably tuberculous. Clinical and surgical diagnosis gave degenerative sarcoma. Microscopical examination showed a number of tubercle bacilli in nearly every section, but no evidence of neoplasm.

Recovery after operation has continued to be very satisfactory to date (June 15, 1922).

"The epiphysis of the greater trochanter is not different than the epiphyses in other locations and is probably more frequently infected with tubercle bacilli than has been reported in the literature. Bone infection is certainly more frequent than new growth.

"In this case bony changes were noted by roentgen ray examination sixty days after injury, though no diagnosis was made by roentgenologists of unquestioned ability and very wide experience."

Roentgen Ray Diagnosis of Tubercular Cervical Lymph Glands. John Munn Hanford, M. D., Am. J. Med. Sci., 164:539, October, 1922.

CALCIFICATION in tubercular glands of the neck is said, by good authorities, to be rare, but the author does not agree with this view and he states that "a positive diagnosis of tuberculous cervical glands, abscesses and sinuses may be made so frequently by a small plate, studied with the clinical picture, as to render the roentgen ray worth a trial before subjecting he patient to a biopsy."

In his practice 200 cases of tuberculous cervical glands have come under his observation and treatment during the last three and one-half years. X-ray plates of the necks of forty unselected patients from this toal of 200 showed definite areas of unusual density in 21 of the 40, and these areas corresponded in location to the lesions found upon physical examination. Ten of the 21 were pronounced tuberculous by microscopic examination and the other 11 were clinically typical of tuberculous glandular cases. There was no doubt about seven of these, the other four presented cold abscesses which contained caseous matter and which persisted as sinuses.

These 21 positive plates show that beyond all reasonable doubt tuberculous cervical lymph glands may give evidence of calcificaion, "and, conversely, that the evidence of calcification, studied in conjunction with the clinical findings, spells tuberculosis." Also it shows that occurrence of this lesion is sufficiently frequent with tuberculous lesions of the neck to warrant the routine use of the plate. Even though there is a good chance of the findings being negative, one plate should be made; a small one fitting snugly against the back of the neck between the occiput and the second dorsal is more apt to pick up the smaller shadows than is a larger plate. One anteroposterior view is sufficient, lateral views are rarely helpful.

Roentgenography of Intracranial Passages Following Spinal Air Injections. Charles L. Martin, M. D., *and* Claude Uhler, M. D., Am. J. Roentgenol., 9:543, September, 1922.

"INJECTION of the subarachnoid space with air appears to be a relatively safe procedure where the cases are properly selected." Brain tumor in the posterior fossa is the most important contraindication to this procedure. "The after effects of the injection are not serious. The proper interpretation of roentgenograms of the skull made following such injections should aid ma-

terially in improving the mortality statistics now credited to brain surgery."

The Effect of Radium on the Normal Tissues of the Brain and Spinal Cord of Dogs, and Its Therapeutic Application. Eugene P. Pendergrass, M. D., J. M. Hayman, Jr., K. M. Houser, *and* V. C. Rambo, Am. J. Roentgenol., 9:553, September, 1922.

THIS PAPER gives the results of an experimental study "of the effects of radium radiation upon the normal tissues of the brain and spinal cord of dogs, both by application and by implantation" and discusses the therapeutic application of x-rays and radium.

Clinical symptoms and gross effects are considered. Microscopical study is limited to a practical consideration of the depth of penetration of the rays. A more intensive microscopic study is contemplated which shall compare these microscopic findings with known lesions of the brain and cord.

A review of the literature which deals with the effects of radium upon lesions of the central nervous system occupies several pages of this study (the bibliography includes 71 references to the literature of the past 25 years) and a detailed account of the writer's experimental study then follows:

The author's conclusions, drawn from this study, are: "(1) An exposure of the normal brain tissue up to 1,150 mgm. hours is compatible with life (surface application). (2) The results on the cord, however, would indicate that exposure of vital areas of the brain as well as exposures of the cord should never be made by surface application or by implantation. (3) Microscopic studies indicate that considerable changes are to be found with exposures that give no clinical symptoms. (4) The brain after exposure of 1,000 mgm. hours shows a general swelling throughout the entire radiated hemisphere, which, from our studies, must be ascribed to the production of an edema which is not limited to the radiated area, but extends throughout the entire hemisphere. (5) Radiation of the brain by radium (surface application and implantation) can produce severe general symptoms which indicate that a powerful toxin has been produced from the radiated tissue. (6) The effect of radium is due to a twofold action, first, an effect upon the nucleus and cytoplasm of the cell, which causes, secondly, the death of the cell under conditions favoring autolysis. The direction of this autolysis is determined by the chief component of the radiated cells. If this be protein the toxic products of proteolysis may exhibit their general effect. If the chief component be lipoid compounds, we believe that the resultant autolysis may free the toxic companents of lecithin, and produce their characteristic reactions. (7) The use of radium as a therapeutic agent in the treatment of brain tumors is recommended, but should be undertaken only after one is thoroughly familiar with the dangers that may come from improper use thereof. (8) We believe that our experiments on the dogs are applicable to human beings because it is not the destruction of brain tissue that causes death, but some toxemia, and in the application of radium in the treatment of malignant tumors of the brain of humans the normal brain tissue should not receive more than 1,150 mgm. hours."

Directions are given for therapeutic application in cases of inoperable growths, partially removed growths, growths not localizable, growths infiltrating the brain substance, and spinal cord tumors.

"Radium is recommended (1) as a prophylactic against recurrence after removal of brain tumors; (2) as a prophylactic against recurrence after sella decompression; (3) as an active agent in the treatment of cases of recurrent visual disturbances after sella decompression has been performed; (4) as an active agent by direct implantation into inoperable tumors supplemented by crossfire radiation through the scalp (external application); (5) as an active agent where brain tumors are only partially removed, by implantation of radium into the center of the cavity, and supplemented by crossfire radiation externally; (6) as an active agent by crossfire radiation (external application) in brain tumors which cannot be localized or discovered by operation. (7) Treatment of spinal cord tumors should be restricted to crossfire radiation by the roentgen ray or radium, as in surface application there is a great possibility of causing paralysis."

The Significance of Nasal Polyps. H. G. Shirley, M. D., South. M. & S., 84:369, July, 1922.

THE CLINICAL picture varies widely. The patient may be in perfect health, but most often he is anemic, undernourished, nervous and irritable. Chronic pulmonary changes may be present

Illustrating the frequency with which nasal polyps are missed, St. Clair Thomas is quoted as saying: "Mistakes made are probably more frequent than in other of the ordinary affections of the nose and are only equaled by the frequency with which polyps are overlooked."

Polyps will be found most frequently springing from the anterior end of the middle turbinate, and when so present infection in the antrum should be looked for. In diagnosing polyps in the antrum the x-ray is an invaluable aid, as it may show polyps when transillumination does not and when irrigation gives negative findings.

A number of sinus radiographs illustrate the original article.

W. W. W.

An Analysis of the End-Results of Tonsillectomy and Adenoidectomy. Samuel A. Blauner, M. D., *and* Samuel Z. Orgel, M. D., New York M. J., 116:142, August 2, 1922.

THIS ARTICLE is of interest to radiologists who have to answer the oft repeated statement that x-ray treatment of the tonsil is not effective. The stand of the radiologist might well be that radiotherapy will dispose of the infection arising from the tonsil; if the distant ailment which is supposed to be caused by this infection is not cured, it probably has no connection with the tonsil (Abstractor's note).

To see whether the expected results had taken place, and also to determine whether removal of the structures had had any detrimental effects the authors analyzed one hundred cases of tonsillectomy and adenoidectomy.

The causes for removal were as follows: Frequent colds, 55; mouth breathing, 44; malnutrition and anemia, 16; tonsillitis, 18; otitis media, 9; asthma, 4; cardiac lesions, 4; advice of school nurse, 7; stunted growth, diphtheria and chorea, 1 each.

Of the 55 cases operated for colds 51 per cent showed no improvement. Of the 44 cases operated for mouth breathing about 33 per cent were relieved of either the primary symptom (colds) or the secondary symptom of mouth breathing.

Of the 16 malnutrition cases only 25 per cent proved to be in good general condition.

Of the eighteen cases of tonsillitis 83 per cent gave no further tonsillary symptoms. In clinical tonsillitis with a follicular exudate associated with rheumatic tendency the indications for removal are the clearest, the purpose being the removal of the source of rheumatic infection.

Of the 9 cases of otitis media 67 per cent were cured. The other three cases were uneffected. The indications for removal of the tonsils and adenoids in chronic otitis media are clear.

No improvement was seen in any of the four asthmatic cases. Results in the four cases of cardiac lesions seemed to justify operation. The seven children operated upon by advice of the school nurse were healthy before operation, but four of them were not as well after-

wards. The one diphtheria carrier was converted into a non-carrier.

W. W. W.

Statistics and Technique in the Treatment of Malignant Neoplasms of the Larynx. Douglas Quick, M. B. (Tor.) *and* F. M. Johnson, M. B. (Tor.), Am. J. Roentgenol. 9:599, September, 1922.

THE USE of radium in the treatment of carcinoma of the larynx cannot yet be regarded as an established method of treatment, but experience holds out the hope that it will become such.

A series of 156 cases have been thus treated at the Memorial Hospital during the last five years. Twenty of these were primary operable intrinsic carcinomas. Four of these were complete failures, seven are clinically well, seven are making good progress, one was at first improved, but has been lost track of and one, owing to unsuitable radiation, required subsequent operative treatment and is now well, but, of course, cannot be counted among the radium cures.

The author's summary is as follows: "(1) While radium offers hope to a larger number of cancers of the larynx than the older methods, its use must be considered to a certain extent experimental as yet. (2) Before treatment of a laryngeal neoplasm is undertaken, proper classification, based on what can be reasonably hoped for, should be made, and the method and intensity of treatment governed accordingly. (3) While treatment of primary operable intrinsic cancer of the larynx is permissible, the evidence to date does not warrant advocating it as the agent of choice. (4) It is suggested that the preoperative use of radium in operable cases would add materially to the end-results. (5) Surgical exposure may frequently be used to advantage in radium localization. (6) The radical use of intensive radiation is permissible in cases offering a reasonable hope for complete recovery. (7) The conservative use of radium in inoperable cases offers palliative relief in a large percentage. (8) Radium should be withheld in the very advanced cases."

Treatment of Nasal Polyps by Radium. Horace R. Lyons, M. D., Am. J. Roentgenol., 9:584, September, 1922.

THE MAYO CLINIC three years ago undertook the postoperative radium treatment of nasal polyps. Since no permanent cure has yet resulted from any form of treatment this postoperative treatment was determined upon in the hope that stimulation of fibrous tissue growth in the recurring polyps would make a second operation more successful.

As yet experience with this form of therapy has not been sufficient to allow of definite conclusions with regard to its effects, but the results in the 55 cases so far treated show that radium lengthens the intervals between recurrence and that definite operative cures occur more often when radium is used. It has no effect however upon a suppurative sinus disease which must be eradicated for a permanent cure to follow.

At first radium burns were feared and great precaution was exercised in its administration, but it was found that 200 mg. hours at weekly intervals, not oftener, did not produce a burn. It is stated that postoperative weekly treatments of 150 mg. hours can be continued indefinitely without a resultant burn.

Applications are begun the second or third day following operation. The radium is screened by thin silver tubes surrounded by sterile rubber from a finger cot.

Three cases are reported in detail.

Sunlight Against Death. C. W. Saleeby, M. D., F. R. S., World's Health (Red Cross), 3:416, September, 1922.

BAYLISS is quoted as saying that he is quite convinced from his observations of work done in American institutions that ultraviolet light cures and prevents rickets, both in children and animals. The author makes a marked distinction between light and heat in their therapeutic effect. Light is beneficial, but only when heat is not excessive. "Solar heat paralyzes, solar light stimulates."

"Dirty, smoke-polluted air * * * is opaque to rays of just those wave lengths (in the ultraviolet not far from the visible spectrum) which Lodge and Marshall Ward found to be most lethal to anthrax bacilli." Coal smoke has an almost specific action in filtering away the antiseptic solar rays, but more important than this, he believes, is the loss of the effect of the specific absorption of light by the blood.

His plea is not so much for the therapeutic use of ultraviolet rays or sunlight as for the protective use of sunlight. He calls rickets and tuberculosis "diseases of darkness' and he characterizes Sheffield as "that smoke-cursed, rickets-and-tuberculosis haunted survival of 19th century industrialism and waste at their worst." Great Britain's next great hygienic task is "the restoration of sunlight to our malurbanized millions, now blackened, bleached and blighted in slums and smoke."

Cinematographic Evening. J. Roentgen Soc., 18:176, October, 1922.

THIS is an interesting account of a "movie" attended by the Roentgen Society last May.

The films were produced by the Radium and Chemical Company of Pittsburgh, Pa., and the first one depicted the mining of carnotite ore in Colorado and its transportation from there to Pennsylvania.

Five hundred tons of this ore contains on the average one gram of radium. European ores contain one gram of radium to every five or six tons, but the supply of ore is limited. The mining of this low grade Colorado ore was conceived by the late Joseph N. Flannelly, to whom, therefore, belongs the credit of giving the world all the radium it needs.

The ore is first reduced one-fourth in bulk at the concentration mill and is then sacked and carried 65 miles by horses and motor to a narrow gauge railway, by which it finally reaches the main line, then travels 2,300 miles to the company's reduction plant in Pennsylvania, where it is reduced to a crude barium bromide. thence it is sent to the company's research laboratories in Pittsburgh.

A second film showed the production of metallic tungsten, the preparation of the cathode and anode of the tube, the exaustion of the bulb and all the other arrangements for x-ray production. The nature of the rays was brought out by the lightning line-drawing methods used ordinarily in "the funnies." Abstruse phenomena of physics were delineated with essential accuracy.

Dr. G. H. Rodman, the chairman of the evening, remarked that much good would come from the release of these films for popular consumption.

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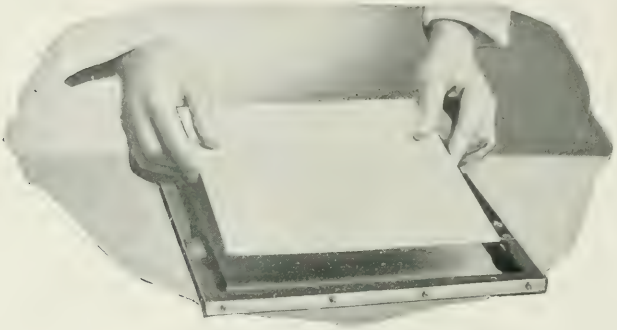

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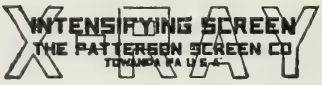

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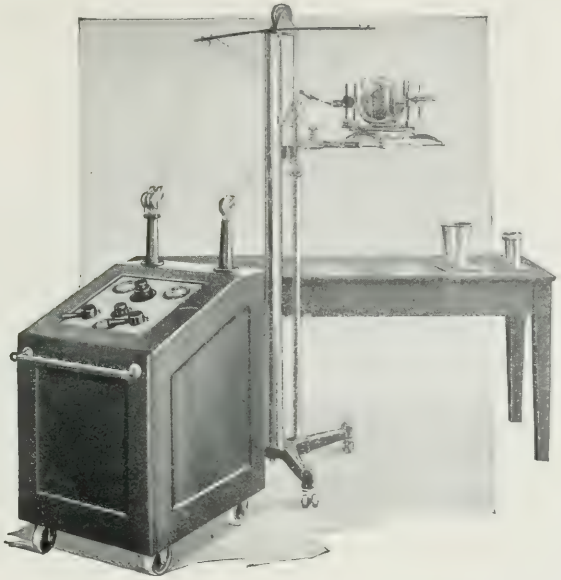

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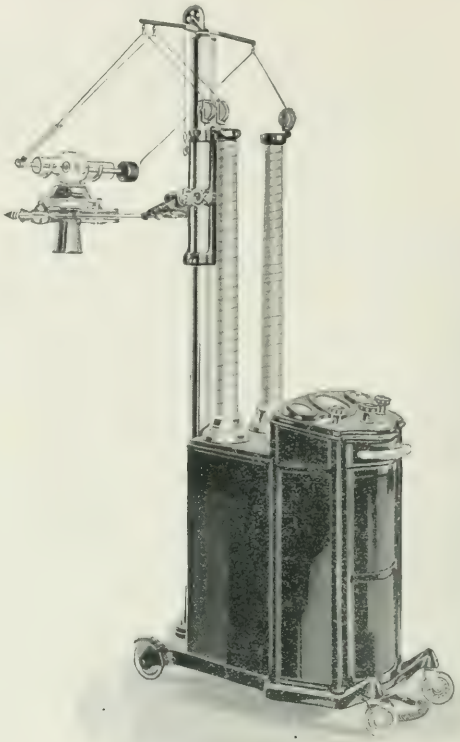

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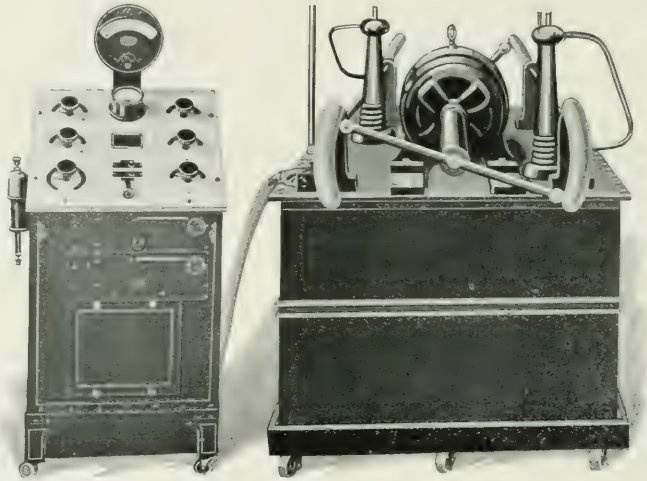

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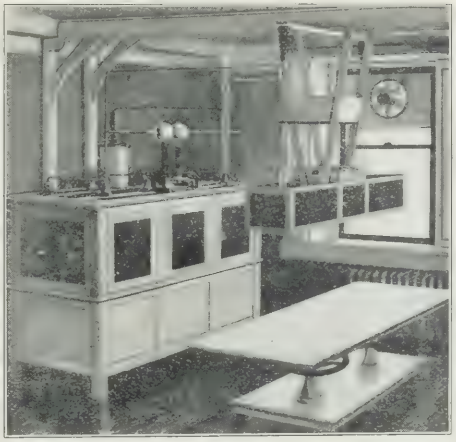

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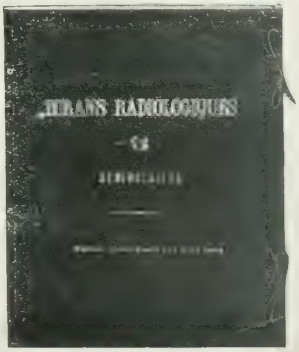

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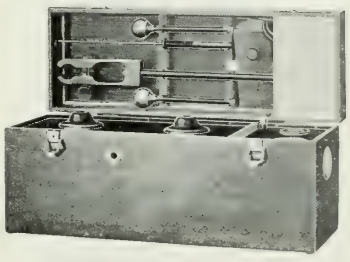

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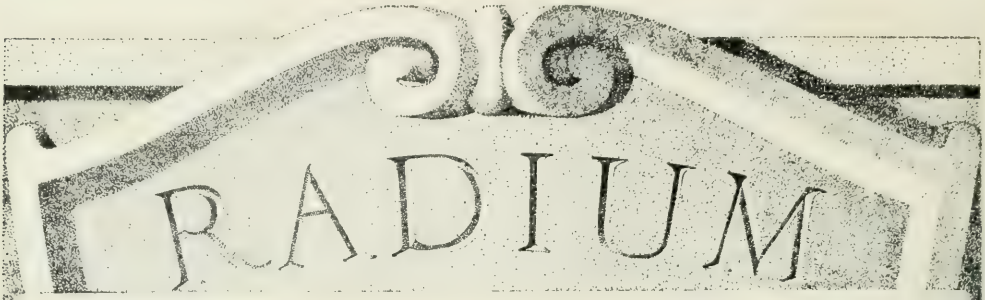

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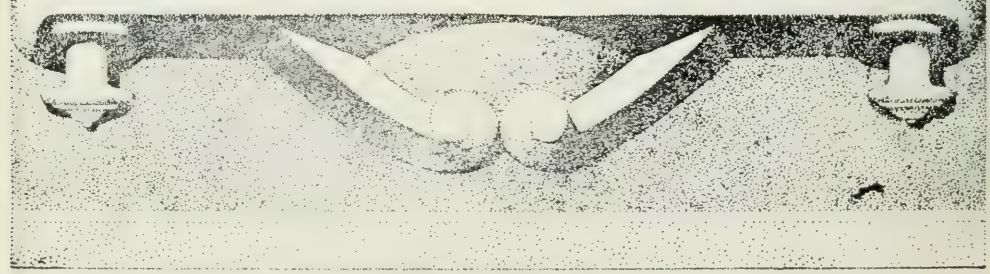

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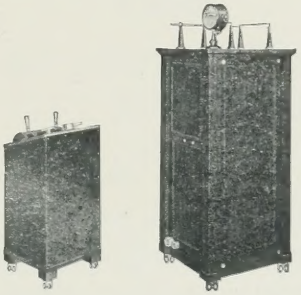

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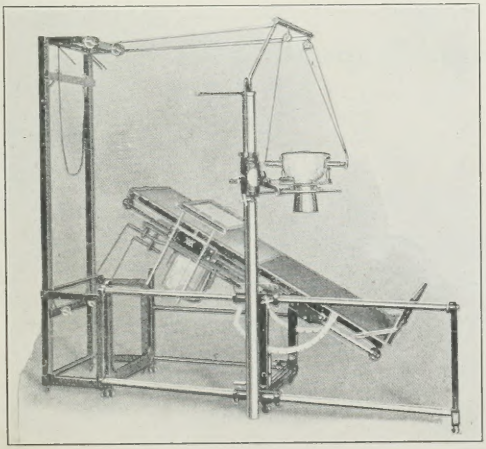

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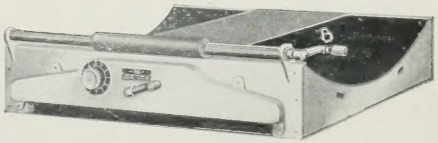

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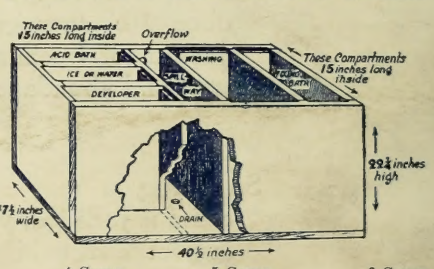

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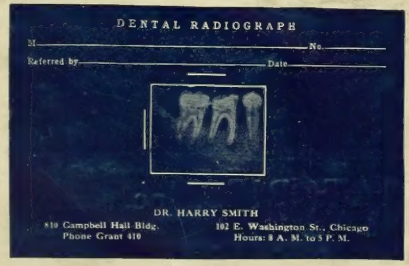

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